VOLUME TWENTY-ONE

THE AMERICAN JOURNAL OF PHARMACEUTICAL EDUCATION

F A L L

THE OFFICIAL PUBLICATION OF
THE AMERICAN ASSOCIATION OF COLLEGES OF PHARMACY

NINETEEN HUNDRED FIFTY-SEVEN

THE AMERICAN JOURNAL of PHARMACEUTICAL EDUCATION

VOLUME 21 FALL, 1957 NUMBER 4

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Published quarterly by the American Association of Colleges of Pharmacy, partially supported by the American Foundation for Pharmaceutical Education. and printed by the State College of Washington Press at the State College of Washington, Pullman, Washington. Subscription price $4.00. Single copies $1.00 (1958 subscription price $5.00. Single copies $1.25). Reentered as second class matter February 15, 1956, at the post office at Pullman, Washington, under the act of August 24, 1912.

Editorial office: School of Pharmacy, State College of Washington, Pullman, Washington. Address all communications concerning manuscripts to the Editor. Instructions to authors will be found in the announcement section of each Winter issue. Business office: College of Pharmacy, University of Illinois, 833 South Wood Street, Chicago 12, Illinois. Address all subscriptions and other business communications to the Business Manager. All new subscriptions begin with the Winter issue. The Journal assumes no responsibility for statements made by authors.

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ARTICLES

FEDERAL AID TO EDUCATION*

CARTER DAVIDSON

I was assigned the topic for my talk here today because it has been pretty well known over the last twenty years that I have been in educational administration that I have some strong opinions on the subject. I gathered that you wanted to know just how those opinions stand today, whether I still believe as strongly as ever in the independence of the colleges of pharmacy, and our colleges and universities in general, from federal subsidy.

My reason for interest in this issue, which is becoming more and more a very pressing issue in this year of 1957, goes back to my appointment as a member of the Committee on Relationships between the Federal Government and Higher Education during World War II. I went on that committee about 1943 and have been serving on it for the last fourteen years.

Practically every other meeting of that Committee—and it has met very frequently during that period of time as part of the American Council on Education—has faced this issue in one way or another, and it has been a constant subject of discussion. Yet if we talk about federal aid to higher education as something that is pure theory, that has never happened, we are talking through our hats, because we have had federal aid to higher education in the United States of America practically from the beginning of our government, and certainly in very marked form ever since 1863. In 1863 the Land Grant Act was passed, and a number of land grant colleges were established throughout the country which received not only a grant of land as endowment from the federal government by a vote of Congress, but also an annual appropriation which has grown through the years. Not only has this aid been given for agricultural education and mechanical education but also for experimentation in a number of other fields which have been included in the purview of the land grant colleges.

You will recall, I am sure, that in 1918, at the close of World War I, the federal government felt that many of our colleges and universities could be of very useful aid to the nation in the provision of training for officers for the Army, and, therefore, the Reserve Officers Training Corps was established. They have been in operation now for some forty years. They operate on many of our campuses, some 600 of them for the three services at the present time. All the land grant colleges, of course, have such units in operation, but there are hundreds of them on private college campuses as well.

In the ROTC program not only is the federal government providing uniforms and some small allowances to the students who participate, but also the salaries of the teachers of the military science subjects. It provides the teaching equipment and in some cases have actually contributed toward the erection of

*Presented to the AACP, New York City, 1957.

some of the quarters which have been occupied by the ROTC, though that has not become as prevalent a practice as some of us would like.

During the depression the federal government decided to come to the aid of higher education and instituted what was known as the National Youth Administration. We struggled for years during the depression over the federal government's part in helping youth, and the NYA did very definitely help youth. It presented quite a problem to the colleges to see that this so-called "made work" was of value to the student educationally and was not a detriment to the institution; but the NYA program certainly was a major program of federal financial aid to one aspect of our education.

The greatest of all the programs of federal aid in the field of higher education came at the close of World War II, with the public laws that were set up to take care of both the G.I's who had been interrupted in their period of academic training and those who had suffered some injury and required rehabilitation. Under those laws, some ten million individuals received some form of aid from the federal government and considerably over ten billion dollars was expended by the federal government in that program. That is still in operation in its Korean veteran form at the present moment, though the number of veterans receiving such federal aid has now dwindled to a point where it is not a serious factor either in the federal budget or in the budget of most of our institutions.

Over 100 million dollars a year is being poured into our campuses in one form or another for research, and in that I am not counting Los Alamos and the Argonne National Laboratory and the other major research projects which are being carried on under the aegis of the University of California and the University of Chicago, and so forth. There are many grants being made directly to the colleges through the United States Department of Public Health and other agencies.

As you know, there has been a considerable amount of money loaned to the colleges during the last few years for the erection of dormitories to take care of the increased enrollment.

The federal government's giving money to various endeavors in the field of higher education has undoubtedly whetted the appetites of many university administrators who feel that "The Federal Government has the money. Let's figure out a program which will get the money into our coffers."

At the present moment in Congress there are more than a dozen different bills which deal with various ways in which the higher educational institutions of the country are suggesting to the federal government that they would like to secure federal aid. Some of these bills deal with gifts toward buildings to take care of the vast increase in enrollment which is prophesied during the next few years. Others deal with gifts for the training of people in specific fields such as medicine. Others deal particularly with aid to the students in the form of scholarships, at the present moment the most popular idea. There are, as I recall, more than a dozen different bills now before Congress providing for a federal system of scholarships. I happen to serve as a member of the committee of the American Council on Education which has been studying this whole program of federal scholarships and what it means to the American colleges and to the American economy.

So there is no point in my saying to you I do not believe the federal government should under any circumstances give any aid to higher education,

because I would be certainly talking into the wind. Federal aid has been going on for almost one hundred years. The federal government, when it finds some particular avenue that cannot be really worked without the aid of the colleges and universities, is very much inclined to turn to the colleges and universities and say, "Can you do this if we will provide federal money?"

I would like to point out that practically all of these programs of federal aid have really been what we might call "programmatic" in nature. The government has not said, "We are interested in higher education, and, therefore, we are going to give this money to support higher education." Instead, they have said, "We are interested in the training of officers for our military and the institution of higher learning looks like the very best agency we could employ for that. Will it serve as an agency for doing it?"

Even in the case of the "G.I. Bill," Congress made very clear that this was not a program to aid higher education, but a program to recognize the service which had been rendered by the veterans to the United States government and to the citizens of the United States; it was to serve to rehabilitate veterans in order that they might return to their full responsibilities as citizens without too great a handicap.

What will be the fate of the bills that are now before Congress I would leave to your imagination. In the present mood of economy, it seems very likely that they will probably receive last consideration by Congress; at the present moment it does not seem very likely that there will be any very large program of federal aid to higher education, particularly in the area of scholarships. I do not believe this session of Congress is likely to pass a big federal scholarship bill.

The thing that has interested me, however, is that if we had taken a vote of the representatives of American higher education on this issue of a federal scholarship bill thirty years ago, or forty years ago, before World War I, I think it would have been ten to one or twenty to one against any kind of federal program of scholarships.

The American Council on Education and the Association of American Colleges sent out a questionnaire on this topic a few weeks ago, and (I have not seen the final tabulation of that vote, but I did get the tabulation while it was in process and almost completed) the vote has been three or four to one in favor of federal subsidy of scholarships to our students in American colleges and universities.

The question I raise is why has this shift in opinion among American higher educators taken place, and it is really a necessary change that our society must accept? I was born south of the Mason and Dixon line, and I am still known as an unreconstructed rebel. I still believe there is a place for the forty-eight states in the United States of America. I still believe that there is a place for county and local governments in our scheme of government. I personally would like to see our American system of government maintained largely as a scheme of checks and balances, of the division of responsibilities rather than of the lumping of them in one wheelbarrow and pushing it down to Washington.

I admit I am probably old-fashioned in my attitude, and, if the American college administrators are going to vote four to one against me, I suppose I will have to accept defeat; but I am not going down without a struggle, because I think this is an important basic issue in our American way of life.

I will admit—and I am sure you will go along with me on this—that inflation has been making it harder and harder for the colleges and universities to balance their budgets from normal sources of income. The difficulties in getting increases in tuition charges or in tax support from our state or local governments and the difficulties in getting greater income from our endowments mount year by year; the reports that we get each month on the rising cost of living indicate that inflation is still with us. We haven't licked it, and the pressures are going to continue in the years ahead.

I have just come back from a survey of higher education in Turkey. The higher educational institutions of Turkey also are in a very difficult situation because of inflation. They can't make up a budget which has any reality because within a few months all the prices have completely gone to pieces, and they can't live within that budget. I would hate to think that a situation as catastrophic as that is facing our American higher educational institutions, but I do believe there is going to be a creeping inflation in our economy, and also that there is going to be a tremendous increase in the pressure of numbers. We know that the children who were born in the 1940's are now in junior high school, or in the first year of senior high school. We know they are going to be coming to our colleges and universities in considerably increased numbers by the fall of 1960, and by 1965 or 1970 the number is going to be perhaps doubled, because not only will there be the greater gross number, but there is also going to be a greater percentage of these young people wanting to go to college. More of them are the children of people who have gone to college, and they take it as part of their natural heritage that they, too, should go to college. The atmosphere of America is such that our young people now consider a college education just as much a part of their heritage as their fathers considered a high school education part of their earlier heritage.

It is natural that the colleges and universities should look in every direction to try to find some source of support for a program which will help them to meet these two situations. But the question I raise with you is: is it inevitable that we turn to the federal government as the only agency that can possibly solve this problem?

When the makers of the Constitution met in Philadelphia to establish our federal government, they felt that the most important contribution which this new nation had to make to the world philosophy of government was a neat balance between freedom and the sharing of responsibility. As time goes on our admiration for those men increases, because they certainly worked out one of the most beautifully balanced schemes of government the world has ever seen. Even a Britisher—Gladstone—thought it was the most marvelous piece ever hammered off by the mind of man, and he was somewhat prejudiced in his point of view. But we Americans—and we have lived with it successfully now for a long time—realize more and more how wise those men were.

There are two things about their wisdom that I want to bring before you. In the first place, they believed that in some parts of the world one perhaps could have democracy without a republican form of government. In the countries of Europe one could have a monarchical form of government combined with a democracy in the social life of the people. They felt (and certainly history has proved this true) that one could have a republican form of government without having democracy in the society. That, unfortunately, has been the tragedy of many of the Latin American countries, where they adopted the Constitution of

the United States almost verbatim, but they did not have as part of their cultural heritage this feeling of equality and social democracy.

America is the one country in the world where the republic and social democracy have been neatly interlocked and where we have made a go of it. To lose that great heritage by tearing down our system of checks and balances and of the allocation of responsibilities as set up by the makers of our Constitution because we are pressured by numbers or by an economic crisis would be the greatest tragedy of the twentieth century.

There was no word in the Constitution of the United States about where the responsibility for education should lie, but not because Madison and Franklin and the other men who helped to draw up that Constitution weren't interested in education. They were probably the most highly educated men of their day. They were also, many of them, college graduates; many of them were trustees of colleges; many of them were extremely active in the educational life of the nation. Benjamin Franklin had been the founder of what became the University of Pennsylvania, and there were a number of graduates of Princeton in that group who had been indoctrinated with the whole idea of American democracy by Witherspoon, the President of Princeton. I am sure that those men were very, very much concerned about education when they wrote the Constitution. It wasn't that they weren't interested or that they weren't concerned; it was a deep faith on their part that education had to be a grass roots matter. It was not something that should be taken over as a responsibility of the national or federal government, but it was a privilege to be left to the states, to the municipalities, to the counties, to the local governments.

I am enough of a historian to admit there have been some changes that have taken place in American life since 1789. I know, for example, Chief Justice Marshall interpreted the Constitution as implying there were powers not spelled out in the Constitution that nevertheless were implied powers given to Congress. He built up the strength of the federal government tremendously by his interpretation of the Constitution.

I will admit also that there was a war, which in some sections of the country is called the War Between the States, that was fought over the issue whether the federal government or the individual state government should have the final authority in deciding on certain issues. Some people think the Civil War is still going on. The federal government came out of the Civil War much stronger than it had been before.

The passage of the constitutional amendment which set up the federal income tax law put another terrific weapon into the hands of the federal government. I am sure that at the time Congress passed that law people thought this would just be a nice supplementary source of income. They did not realize that within a period of forty years this would become the major source of income for the government and that there would be more money collected through the federal income tax than through all the other taxing bodies put together. Whatever their thought on the matter at the time, that is what has happened; today the federal government is tremendously strong because of the federal income tax.

I feel personally that we should not lift up our voices in wails and demands upon the federal government for financial aid to meet our problems in higher education because, number one, the federal government has enough to do without adding this to its burdens. In the fields of international relations and

of national defense alone, it has enough to keep both hands filled and overflowing for many, many years to come. There are some areas, like the postal service, which, because of their very nature, are forced upon the federal government. You can't carry them on through the individual states.

In the second place, our experience over the last 160 years has shown us that in the process of channeling money through the federal government there is an inevitable attrition of funds; we never get quite as much back from the federal government as we put into it. We can't maintain the millions in the federal offices and bureaucracy in Washington for nothing; it costs money. Every time we set up a new responsibility of federal government, the overhead takes a good slice out of the actual budget that is available.

I am not implying that there is gross waste in the federal government. I think the federal government is run as well as can be expected, but just by the very nature of bureaucracy there is a loss. I would like to prevent all losses in the process of getting the money to where it should be used.

In the third place, I am convinced that we have in America in our educational system something of which we can be proud. The Commission on Financing Higher Education, which published a report, you may recall, about three or four years ago, felt very strongly that the great secret of American success in higher education lies primarily in what might be called "creative diversity." The fact that we have so many different programs, that we have 1,800 or 1,900 different institutions offering hundreds of programs is the great strength of American higher education. In contrast, the "coerced conformity" of a system such as you can observe in some of the European countries, although it may enable the commissioner of education to know exactly what is being taught in every classroom at ten o'clock on a Monday morning, nevertheless, prevents the type of advance which has taken place in higher education in our own nation.

We have great diversity in the size of our institutions. Some of our colleges in America are operating with student bodies of 100 and doing a good job; others are operating with student bodies of 50,000 and doing a good job.

We have institutions of varying costs, some of them very expensive in their operation. Others are very economical, getting along on almost a shoestring. There is no reason why education should be doled out as costing X dollars per student hour. It can vary tremendously according to the kind of program.

We have institutions for differing types of people in our society. We have institutions which are coeducational, institutions for men, and institutions for women; the great variety is part of our American glory. I would hate to see that exchanged for a system which inevitably would become more and more centralized in its programming, more and more dependent upon the coffers of the federal government, and, therefore, more and more dependent upon advice from a centralized agency.

In the fourth place, there is a danger that this may be just another step on the road toward totalitarianism in higher education. I remember very vividly how in our own state of New York a few years ago, at the end of a survey of our higher educational facilities in New York state, the statement was made that New York was very much behind the times because it did not have the same formula of higher education as was used by the state of California, where about 80 per cent of all the students attended state-supported institutions and only about 20 per cent attended privately supported institutions. In the

state of New York, two-thirds of all students in the state attended the privately supported institutions and only a third the public supported.

I take my hat off to California; it is fine that California developed in that way. The state universities came in very early in the development of the state and became an important part. They have done a magnificent job. Nobody could have greater admiration than I do for the integrated system of higher education which the state university and the state colleges and the public junior colleges of California present. But there is no reason in our American system why any one formula is the only formula which Americans can use. New York should have the right to work out its own scheme, which may be just as effective for the needs of New York as the California scheme is for California.

Some of you will say to me, "Are you implying that the federal government does interfere in various areas in which it gives money?" Here I am treading on dangerous ground, but I must say that my experience in the last fifteen years on the Committee on Relationships to the Federal Government would imply to me that even in such a program as the G.I. Bill, which was handled probably as effectively as any such program could be handled, there were constant attempts on the part of the federal government to dictate to the colleges the kind of programs they were to offer, the regulations that were to be imposed, and even such matters as whether a course was to be considered educational or noneducational. Many of what we could consider essentially decisions of educational policy were being taken away from the colleges by the Veterans Administration. I remember when we actually had to go to Senator Taft and ask him to introduce a bill in Congress which would prevent the Veterans Administration's trying to legislate by decree in certain areas of higher education. This bill was introduced, and the Veterans Administration had to back up.

I think the ROTC is a very fine thing, but no college administrator can say that ROTC has not affected the program of education in his institution. It is impossible for a student to take certain courses in the junior and senior years because he has to take an ROTC course which fills out his program.

Yes is my answer; the federal government *does* interfere with the administration and with the policy of higher institutions when it gives money for a program. I don't see how they could do otherwise, because they are responsible for the program; they are responsible to see that it operates and, therefore, they will more and more indicate how the program is to be run and what kind of educational ideals are to dominate.

These are not my main reasons, however, for feeling that we should not go to the federal government at this time (or at any time, I hope) for federal subsidy of higher education. My main reason is that I think we can find the support elsewhere. In the first place, I believe that our states and our local governments are not doing all that they can for higher education in America, that there are tax resources there if we can really work out a system by which the tax resources of the nation can be equitably assigned to the various taxing bodies. We can't just let this problem go by default. The federal government will take all the tax money eventually if it is allowed to, and, therefore, the various taxing bodies are definitely given their own areas in which they can tax with effect and with reason. I believe there is plenty of money in the

American states and in American society to support higher education if the channels are left open.

Some of you will say, "Is it true of the state of Blank located somewhere in an underprivileged section of the country where we understand there is no income to support anything?"

My answer to that would be yes; even though ten or twenty years ago there may have been some states having a hard time financially, the last ten or twenty years have seen tremendous improvement in the economy of those so-called "underprivileged states," and if they had a better tax base upon which they could operate, they, too, could give adequate support to higher education.

In the second place, I believe we have a growing group of individual supporters in our alumni. Our colleges are now graduating a half million each year into the channels of our society, and the number of college alumni is growing by leaps and bounds. They represent certainly the upper half and probably the top 20 per cent of our society, economically. They should be a great potential for support.

Alumni support is not only for the independent colleges. The state universities, the tax-supported institutions, also have every right to turn to their alumni and say, "We have done a great deal for you. Now, it is up to you to pour some of your own extra income into the society which has given you your training."

In the third place, there has been a great growth of a wonderful new phenomenon in America, the foundations. We used to talk as if there were only a half-dozen foundations worth mentioning, back in the days when Rockefeller and Carnegie and one or two others seemed to dominate the picture. Today there are approximately 10,000 foundations over this country, some of them probably in your own backyard that you haven't even heard about because there has been no publicity given to them; they are being established as family foundations, as corporation foundations, as foundations included in estates and bequests and wills which will over the years provide vast sums for the support of higher education.

The marvelous gift of the Ford Foundation to higher education in this country last year and this year—because most of us are expecting another check on June 30, of this year—gives evidence that the foundations are a great support of our American scheme of education. Let's not sell the foundations short by saying, "They aren't going to do enough," or "They have come too late with too little and, therefore, we must turn to the federal government."

In the fourth place, the churches of America established hundreds of these colleges. Many of the churches have maintained their channels of communication with the colleges. Now that the bamboo curtain has descended to prevent missionary work in some parts of the world by our churches, they could be doing a wonderful missionary work for the world by going to the colleges with the same money and pouring it into the support of higher education under church auspices. There is no reason at all why the churches should think of the establishing of colleges as a closed chapter, something done in the nineteenth century and no longer a major issue. Today the churches of America can and should be supporting their colleges with every bit of their enthusiasm and with their funds.

In the fifth place, I think there are a great many volunteer organizations which have not as yet thought of higher education as an agency which they should

support, but which should be encouraged certainly to think of higher education in that way. I am thinking now, for example, of such organizations as the luncheon clubs or the fraternal organizations or the labor unions. Why shouldn't a fraternal organization adopt a college and say, "Here's the place where we would like to show our interest in higher education; we will pour money into the support of that institution." I know, for example, of one college in Missouri which is supported by a women's fraternal organization that has been giving it financial support over the years. I would like to see that idea grow.

Since I am talking to a group of professional men here in the pharmaceutical profession, I want to say that I have been very much encouraged by the attitude taken by the American Medical Association in saying that the medical schools of the country must be supported by the members of the profession and "Therefore, we are going to go out with every power at our command to get the doctors, the local doctors, to support medical education in their own alma mater and in the medical college which is serving their community." As a result of that effort, the gifts from the physicians to the medical schools have gone up by astronomical figures in the last few years. We have been encouraged, for instance, in my own university by the support that is coming to our medical school from the doctors. The same approach should be made to every professional group. The members of the pharmaceutical profession in America have a definite responsibility to the support of the pharmacy colleges in America. This group and the whole pharmacy profession should get behind the movement to see that the local pharmacist has his part in the support of the schools which train for his profession.

Finally, the great white hope of the last few years is the American corporation. Naturally we have looked to the corporations as a place where we should get support, because they have all the money—the corporations and the federal government between them.

Perhaps we haven't been able to get money from John Jones, but if we can get money from the John Jones Corporation, because one tax deduction is eliminated in the process, in that way they will save money and education will get it. So we have been encouraging the corporations. Corporation support, under the stimulation of such men as Frank Sparks, of Wabash College, has been rising tremendously in the last ten years. I have been so encouraged that I have a feeling if the corporations of America are properly awakened to the crisis and to the need of higher education, they can do a great deal toward the support of higher education by making it part of their normal budget.

I believe the corporations realize that the whole free system of economy in America depends to a great extent upon the maintenance of our free, untrammeled, uncontrolled system of higher education in America; if the educational system goes to pot, the corporations are not going to last much longer.

These corporations, however, certainly have the right to ask of us, are we colleges and universities doing all that we should in the keeping of our own shop? Are we running our colleges efficiently? On my campus ever since the early 1800's, it has been written into the contract of the faculty members that they have a right to pasture one horse and one cow on the college campus. Of recent years there have not been very many horses on the campus, but there have been a tremendous number of cows. These cows we call "sacred cows," and we are very reluctant to sacrifice them on the altar of educational efficiency,

because they became part of our idea of the genteel academic life. But industry is looking at us with very jaundiced eyes at the present, saying, "How about those sacred cows? Can you justify, for example, having your campus operate only nine months a year and closing it up in the summertime? We couldn't run our plants on that basis. Can you justify having your laboratories used only in the afternoons and not at all in the mornings or not at all in the evenings? We couldn't possibly justify the use of our buildings for only two or three hours a day. We have to use them around the clock if we are going to consider that we are operating efficiently.

"Can you justify an organization in which the faculty teaching load is determined on the basis of a certain number of hours of classroom performance? Don't you feel that the whole system of the faculty teaching load ought to be reexamined to get a more realistic appraisal of what the faculty member does with his time and where the most effective use of his time should be?"

I had a very illuminating interview with one of our leading corporate officials not long ago. He said to me, "Davidson, I am sympathetic with the plea that you college people put up about need for funds, but I can't understand this: why is it that during the last fifty years, American industry has increased the productivity of the average worker by 100 per cent, 200 per cent, 1000 per cent in some industries, and we can get a tremendous amount of work out of the average worker that wasn't possible fifty years ago; but in the educational profession at the present moment you are probably able to handle a smaller number of students with the faculty members than you could fifty years ago? Why is it that productivity of the average faculty member has declined at the same time the productivity of everyone else has increased?"

I gave him the usual answers that you could think up, about how we have become specialists, and that you can't ask a man to teach everything in the curriculum, and that it takes a great deal of time to prepare the courses that they do teach, and so on. He listened, but he was not convinced. He felt that we need to spend a lot more time in studying the efficiency of our whole operation of teaching in the American universities and colleges to see if we can't do a better job with the talents we have at our disposal. We are probably not going to find a great increase in the number of faculty members available for teaching during the next ten years when these students descend upon us. We have to solve the problem with the more efficient use of the faculty members we have, and there are a lot of ways in which we could tackle that problem. The Fund for the Advancement of Education has appropriated considerable sums of money, as you know, for experiments in this field, and we owe it to ourselves to find out if there aren't ways in which the faculty teaching load and the faculty teaching effectiveness can be improved.

Finally, among these sacred cows perhaps the one that irritates the Europeans more than anything else is our American tradition of spoon-feeding the students. They say to me every time I talk with them over in Europe, "How on earth can you justify having faculty members practically leaning over the shoulder of the student at all hours of the day and night? Why don't you let the student take some responsibility for himself? Why don't you give him an assignment and say, 'Here, go and see what you can do with it and come back at the end of the year and show us what you learned? Don't expect us to be giving you an assignment every day and grading your papers and handing them back with the correct answers written in. That is no way in which you are going to grow.'"

Well, is that true? Have we been spoon-feeding our students in America? Should we give them more responsibility for their own education and in that way increase the yield of our educational institutions?

These are justifiable questions which industry is asking. My answer to industry is that with all the skill we may be able to develop in the playing of our hands in this game of cards, we still can't do very much if we aren't dealt a few aces, kings, queens, jacks, and tens. We have to have cards. Therefore, with the support of the corporations, with the support of the foundations and the churches, of the volunteer organizations, of the alumni and the individuals, and particularly of our local communities, of our municipalities, of our states, rather than of the federal government, I think we can work out a solution to these problems in the years ahead.

I am not at all sure the federal government would come through with the money if we asked them for it, but there are a great many people who think there is plenty of money there; all we have to do is hold out our hands. Whether they would grant it or not, my feeling is we shouldn't ask for it. We should go instead to the sources which have been the traditional sources in America for the support of higher education. We should go to the sources which are now being created in our America for the support of higher education; in that way we can leave the federal government to do the jobs for which it was created.

The specious reasoning that the present educational requirements meet the need of pharmaceutical practice today serves as a cloak to conceal the real motives of the organized group which advances this false argument.

J. Allen Reese, Am. J. Pharm. Ed., 16, 533 (1952)

CONSTANTS AND VARIABLES IN THE PHARMACEUTICAL OUTLOOK*

W. PAUL BRIGGS

I am instructed to "review the entire area of pharmacy," to "discuss new horizons ahead in the field of pharmacy," and to describe methods by which education can "meet the challenge of the future." This is a large order! Embracing to the limit my good fortune and strategic advantage in opening this seminar, I shall try to provoke discussion, rather than provide answers, on my assignment.

In our fluid world certain pharmaceutical variables are always undergoing a succession of changes. The relative importance of some pharmaceutical constants may undergo change. But the magnitude of the basic pharmaceutical constants will not change until man no longer suffers pain, injury, and disease. That happy day appears to be far beyond our present horizons.

Perhaps the most important factor in the pharmaceutical outlook is to be found in the mental outlook of each individual pharmacist. Here lies the future strength or weakness of pharmacy.

Our whole educational effort, and our striving for the advancement of pharmacy, will have failed to achieve maximum potential gain unless pharmacists of tomorrow possess built-in self-respect, confidence, and pride in their place in the social, professional, and economic world.

Morale and balanced self-esteem are relative factors. Who can imagine a corporal in the Marine Corps who would change places with a Navy lieutenant, an Army major, or an Air Force colonel? Did you ever hear of any third-team Oklahoma University football player who would rather be a standout star at Maple State Junior College?

The new strength of pharmacy will come when more and more pharmacists want to be what they are—pharmacists!

Self-respect brings public respect, and good public recognition leads to personal pride. Confidence and personal pride are acquired assets. We must depend upon teachers to develop these qualities, which are essential to happiness as well as success; not just good, faithful, or even dedicated teachers, but rather upon pharmacy-proud and inspired teachers.

A second vital factor in appraising the pharmaceutical outlook is the never-ending struggle against personal obsolescence. Most often men become obsolete by their own failure to continue the learning process; or because their basic education did not equip them for intellectual growth; or because of stagnation in a depressingly dull or excessively demanding job. Through knowledge men can avert their own professional decay, but the urge for knowledge is not always self-triggering.

The ultimate responsibility for the prevention of obsolescence rests with each individual. But our educational institutions—in a narrow frame of reference, our pharmacy colleges—must share this responsibility with the product for which they exist: the pharmacist.

*Presented at the inaugural ceremony of Dr. Edward H. Litchfield, Chancellor of the University of Pittsburgh, 1957.

In my view, we can fairly predict the pharmaceutical outlook by measuring our potential for upgrading individual morale, and downgrading individual obsolescence. This is not an easy measurement; and any answer derived may undergo alteration by unforeseeable forces. There are many pitfalls for earthbound stargazers. But without benefit of esoteric powers, we should be able to work with known constants and variables toward programs for lessening individual obsolescence and raising individual morale.

The 1956 Report of the American Association for the Advancement of Science, Committee on the Social Aspects of Science, said, "Since 1940 we have experienced a series of classic examples of almost immediate conversion of a scientific advance to a process of large practical impact upon society; penicillin, synthetic polymers, nuclear energy, transistor electronics, microwave techniques, electronic computers.

"Recent advances in science have also created completely new industries. Four major industries—chemical, electronic, nuclear energy, and pharmaceutical —represent direct extensions of laboratory experience to an industrial scale. This type of direct transformation of scientific experience to industrial operation is probably unique in human history."

In this headlong race of science, the individual obsolescence of pharmacists, and other professionals, can be prevented only by equally intensive counter measures. The lack of knowledge will result in loss of power—in pharmacy, and in every science and profession.

Here is one of the basic conclusions of the Committee, in which I have taken the liberty of inserting the word "pharmacy" in every place where the word "science" was used:

"The public interest in, and understanding of, (science) *pharmacy*, is not commensurate with the importance that (science) *pharmacy* has attained in our social structure. It cannot be said that society provides good conditions for the proper growth of (science) *pharmacy*. The effort to explain the nature of (science) *pharmacy* to the public is slight compared with the public attention now given to other less consequential areas of human activity. Interest in (science) *pharmacy* as a career is so restricted as to cause a serious and worsening personnel situation."

It would be difficult for us to draft a more accurate description of the position of pharmacy in 1957, than this one on the present status of science.

If company is really any comfort in misery, then pharmacy has an abundance of company in its difficulties with public appreciation and personnel recruitment. By recognizing that pharmacy is not alone with its current problems, perhaps we can be less self-conscious and more objective as we look into pharmaceutical morale and obsolescence.

Proverbs XXIV, 5, tells us, "A wise man is strong; yea, a man of knowledge increases strength." Francis Bacon distilled this down to "Knowledge is power."

Pharmacy—in company with every profession, every business, every social and every economic pattern—has undergone a major revolution over the last fifty years and, more intensively, over the last fifteen years. Every one of these bloodless revolutions started from new knowledge. New knowledge brought new methods, new productivity, new standards, new opportunities, new wealth, and new concepts of living. Truly, knowledge is power.

While pharmacists—as all other Americans—have eagerly embraced their individual benefits flowing from this new knowledge, they sometimes fear and resent the same basic influences when the impact falls upon their own traditional position. Sudden changes may be annoying and sometimes downright frightening, even though changes bring gains more often than losses.

I assume my assignment to "review the entire area of pharmacy" is in the nature of a prologue. I believe we can dispense with historical reviews, and look toward our future horizons by here citing only a few changes that have occurred on the pharmaceutical scene. These examples should serve to remind us of all the constants and variables that have shaped the course of pharmacy since the beginning of the twentieth century.

Let's look at some of the changes, occurring over the past fifty years, that have profoundly influenced the way of pharmacy up to 1957:

1. Enactment of the 1906 Food and Drug Law; the new Food, Drug and Cosmetic Law of 1938 and Amendments; and the rise and decline of state "Fair Trade" laws.
2. Development of medicinal research leadership in the United States; introduction of dramatically effective therapeutic agents; and resulting growth of the pharmaceutical manufacturing industry with national distribution of prescription drugs.
3. Progress in pharmaceutical education from virtually no academic standard to progressively a two-year; three-year; and four-year course; and a five-year program of training projected for 1960; with parallel reduction of practical experience requirements.
4. Expansion of types of merchandise stocked in drugstores; use of self-service and intensive selling methods; television preselling of proprietary medicines and beauty aids; appearance and growth of professional pharmacies; chain drugstores; group medical practice; clinic and hospital pharmacies.
5. Increased ratio of prescriptions-per-physician-per-year from less than 1,000 in 1940, to over 2,000 in 1955; the climb of the prescription department's share of retail drugstore sales from 11 per cent in 1940 to 27 per cent in 1956, with increases in average prescription prices from 89¢ in 1940 to $2.62 in 1956.

Each of you could easily list many different factors that have influenced the course of pharmacy over the last fifty years. But these five may serve to illustrate some of the basic causes of changes in pharmacy, and for our purposes here, eliminate the need for a full "review of the entire area of pharmacy."

Since we are looking forward, no good purpose can be served by debating the specific causes and effects of these or other influences from the past.

Now for the second part of my assignment—"discuss new horizons ahead in pharmacy." This is a far more difficult and dangerous task than merely picking a few random historical facts. I will take the risk with the frank admission that my vision has slipped from its previous 20/20 rating, and the reminder that the "wild blue yonder" is vast enough for each of you to focus on a different horizon.

I guess—and that is all I am qualified or mean to do—that between now and 2000 A.D. the pharmaceutical horizon will brighten, even though storm clouds will drift by occasionally. Within this guess of a bright future for pharmacy, I predict:

1. Stabilization at about the present total of 52,000 drugstores, despite a population increase of well over 50 per cent; however, shopping-center drugstores will increase fourfold to about 10,000 in the next forty years; professional pharmacies will double in number to about 5,000; and the remaining 35,000 drugstores will serve city residential neighborhoods, small suburban centers, towns, and rural areas.

Stabilization in total pharmacy outlets will result from a slowdown of mass population shifts, followed by rising concentrations within established living areas.

Also, skyrocketing of rental, labor, and other overhead costs will require larger prescription and/or business volume per pharmacy to meet fixed expenses, favoring expansion of shopping-center drugstores at the expense of smaller units.

Continued shrinkage of population in rural areas and small towns will accelerate the trend toward "inter-town" medical and pharmaceutical services and general shopping.

Already the number of physicians in group practice, or on salary (in clinics and state institutions), is up from one out of four in 1935, to nearly one out of two physicians in 1955; and is expected to reach three out of four in fifteen years. Patients have accepted "clinic practice," based on "how *long* to my doctor, *not* how far." These forces will result in further concentration of prescriptions and other pharmaceutical activities near the physician's point of service, rather than the patient's home.

I predict:

2. A gratifying increase in position opportunities open to pharmacists resulting from improved scientific and business education; more specialization within the profession; and that 25 per cent of all future graduates (double the present ratio) will be engaged in related professional, scientific, business, and technical fields, outside of retail pharmacy.

This drain-off from future graduating classes will certainly rise as a direct result of even better scientific and business training in our colleges. Many related, and even nontechnical, activities will soon discover the sound and unique qualifications of pharmacists to fill a variety of positions previously reserved for chemists, biologists, business and management majors, and other narrowly specialized college graduates.

With the total number of prescription departments remaining at about 52,000, but distributed throughout three rather well-defined and basically different-type outlets, pharmacy students will require more adaptive training in college to prepare them for the demands of (1) exclusive professional practice, (2) large store management, and (3) community service centers. All must first be competent as pharmacists, but, for each of these different areas of practice, students will need special training to prepare them for the other demands and duties that will characterize these environments where pharmacy services will be provided for the public.

I am not predicting "three-level" pharmacy, any more than I would call the New York Yankees a "three-level" ball club. Mickey Mantle, Yogi Berra, and Gil McDougald play their parts from three different places, but, with other players, the whole team is the symbol of championship baseball. Which player is most important? Could the team win without all three stars? Of course not. And so, while pharmacy may be practiced in different forms, there will be no

single star, no indispensable level, and no level unimportant to the team and the public.

I predict:

3. That from junior high school on, all educational institutions will operate on an eleven-month basis, thus shortening the total years necessary in preparation for life and career, but further taxing the staff and facilities of our colleges of pharmacy.

Education is a big and costly operation. President Eisenhower has predicted that college enrollments may triple within the next fifteen years. To meet the demand, education must not only receive ever-increasing financial support; it must raise productivity per dollar cost, and accomplish every possible economy in operation consistent with good teaching.

Admiral Hyman G. Rickover, developer of the atomic submarine, says that we can lower our deficit of trained manpower by increasing the typical "school year" from 180 to 210 days. He admits our "nine-month educational year" was justified when America was an agricultural nation, but insists this in inexcusable now. He advocates a goal of fourteen years for completion of general education through college. The Admiral's views, while controversial and not nearly as simple of execution as pronouncement, are likely to accelerate plans to utilize idle physical facilities and get maximum benefit from the talents of teachers, on a year-round basis, as the student and cost squeeze becomes more acute. Apparently Dartmouth College has already taken a giant step in this direction, effective for the academic year 1958-59. This does not mean shortened courses or accelerated education. It means *full-time education*, in the same sense that living and working are full-time activities.

If such a program is generally adopted by education, all professional schools will need increased financial support during the transition period, to provide teaching personnel to meet this load. But this shortening of the total years required for education should result in a larger annual output of all professionals, and ultimately, provide adequate trained manpower, in all scientific and professional fields, at lower cost per graduate.

I am convinced that education will receive the money it deserves and needs only when it persuades expense-minded legislators and profit-minded businessmen, through an "educational balance sheet," that, dollar-wise, higher education is economical, efficient, and productive.

I predict:

4. A marked increase in the number-of-prescriptions-per-person-per-year, especially in the childhood and "second childhood" age brackets, resulting from expanded drug research, new knowledge on degenerative diseases, and future medical attention on maintaining "wellness" rather than treatment of sickness.

With virtual conquest of infectious diseases, drug research is now turning toward the problems of chronic and degenerative diseases. Much progress has already been made, and in the near future we will have an imposing array of drugs to lessen the functional deterioration of wear and tear on the human machine.

Longevity and economics will continually force more elderly people into family-home care. With new, yet-to-be-discovered drugs to retard their chronological deterioration, to extend their years of usefulness, and to control

the illnesses of age, the total number of prescriptions to be provided by pharmacy in the next ten years may easily exceed by 50 per cent the nearly 600 million dispensed last year.

Growing public interest in the prevention of sickness and disease, and widely read medical articles in the public press, will send more and more people to physicians for periodic checkups and preventive medications.

However, with prescription-dispensing-productivity-per-pharmacist steadily increasing, it seems unlikely that even this substantial increase in the total number of prescriptions will require any major increases, in either the number of prescription departments or number of practicing pharmacists.

I predict:

5. Continuous, but not economically serious, diversion of some packaged medicines and traditional drugstore merchandise to nondrug outlets, with parallel expansion of drugstore professional services including: physical therapy appliances, hearing aids, home nursing and invalid requisites, diagnostic aids, clinical laboratory supplies and services, and orthopedic equipment.

Subject to unforeseen developments, it appears that pharmacy will not retain exclusive distribution of proprietary drugs. However, the sale of some home remedies by supermarkets, from an economic viewpoint, will certainly not be disastrous to pharmacy. The public may do some casual shopping for established remedies in grocery stores, but they will not rely on the health advice of butchers and bakers! The intelligent American public will continue to seek guidance on health problems from pharmacists and physicians. It seems likely that disenchantment with drug services obtained from "fishmongers" will be a self-limiting factor against significant sales of such items in supermarkets.

With our aging and aged population increasing almost as fast as babies, it seems inevitable that more oldsters will be cared for by their families, since nursing home costs and limited facilities will preclude placement of all these senior citizens in private institutions. Public institutions for the aged cannot possibly receive the enormous total of these people. Social Security and other governmental benefits to retired folks will become increasingly inadequate to support them. But these funds will help in defraying part of the cost of their maintenance, when added to the incomes of their families.

These oldsters will need above-average medication and home nursing supplies. Here is a field for proper extension of pharmaceutical services.

By default of pharmacy, surgical supply houses have entered this field, but by prompt and aggressive action this substantial and necessary sickroom and home nursing accessory business can be acquired by alert drugstores. And with this service by pharmacy of invalid and nursing sundries will come companion purchases of preventive medications, both proprietary and prescription. Hearing aid and physical therapy supplies; in some areas, opportunity for laboratory testing services; distribution of home testing materials, and other services suporting home care of the aging will, in the near future, become a major element in the total health activities of pharmacy. All of this, plus the professional services nowhere else available, will bring back to the drugstore the distribution of drugs and medical and nursing supplies.

I predict:

6. Introduction of new drugs with actions and potencies requiring personalized adjustment or dosage schedules, and characteristics requiring

special storage and dispensing techniques, that will force physicians and the public to rely more and more upon the scientific knowledge and professional services of pharmacists.

Totally new concepts of drug therapy, nutrition, and geriatrics are on the "drawing boards" in research laboratories and in clinics across the nation. Perfection of these new approaches to the preservation of "wellness" and the prevention and treatment of sickness will bring startlingly new agents into use which, in many instances, will require constant medical and pharmaceutical supervision.

Gone are the days of the five-grain dose, three times a day—for everybody. Future drugs will possess potencies too great for accommodation by the human body, except under skillful and personalized dosage adjustment. The very nature of the unconquered diseases yet to be prevented or treated effectively suggests that their control will not likely be found in simple drugs.

The practicing pharmacist of the future can, if he so wills, become more than a consultant in drug therapy. He can become a professional partner with the physician in the selection, use, dosage, and administration of drugs. And this position will be held by properly qualified pharmacists, not by sufferance or mere convenience, but rather by necessity.

There can be little doubt that some authoritative local source will meet the daily needs of medicine for guidance in pharmacodynamics. It could be done by closed circuit television, or telephonic tape recordings. But this vital source should be provided "live" by pharmacists. I believe that many pharmacists in the years ahead will be working partners with physicians, because the problems of drug therapy in the future will be too involved for determination without recourse to specialized guidance. And from this new domain of pharmacy will come the long-sought professional acceptance and public respect that, at the moment, may appear to be waning, but which may actually be at the beginning of its upswing.

I believe pharmaceutical education can and will meet the challenging changes of the future. In support of this belief, and based on my hazardous predictions, I submit:

1. That pharmacy college enrollments should be increased by 25 per cent to insure at least 100,000 active men and women for the practice of pharmacy, and 25,000 additional for the inevitable professional manpower demands of other activities.
2. That college admission policy should not compromise on the moral, intellectual, and social qualifications appropriate to members of the pharmaceutical profession.
3. That pharmacy colleges should welcome students with motivations and aptitudes for selling, management, business, and various technical laboratory services, as well as for the practice of retail pharmacy, rather than to seek primarily science-minded and purely professional-minded students, with near-genius-level capacities.
4. That we should recognize our stiff competition for bright young men from other vocations that are virtually closed to women. In view of the fitness of women for all types of pharmaceutical endeavor, we should look toward the "durable female" as a fruitful recruitment source.
5. That, within the undergraduate curriculum, specialization courses should be provided for all students who can determine their career preference

midway in their training; but that colleges never relax their basic responsibility of qualifying every graduate as a thoroughly competent pharmacist.

6. The faculties should courageously and constantly experiment to discover better and faster teaching methods.
7. That realism and alert anticipation of new knowledge should govern the content of courses of study, and that annual "thinning and fattening" of course material should be accepted as a moral obligation by every instructor, in every discipline.
8. That every instructor should be held accountable for really effective teaching, and, if qualified, for research; and to these ends, teachers should be relieved of housekeeping drudgery, excessive teaching loads, and penny-pinching clerical duties.
9. That every college should provide the practitioners of pharmacy in its area of service with frequent and realistic refresher training; and that a substantial portion of the resources of every college of pharmacy should be applied to combating obsolescence for the protection of the public, and the preservation of the profession of pharmacy.
10. That colleges adequately staffed, equipped, and financed (as recommended by The Pharmaceutical Survey) should offer an optional, extended professional course leading to the degree of Doctor of Pharmacy for talented students planning careers in specialized professional areas; and that some colleges, now offering limited graduate work, might render greater service by concentrating on this type of sound professional training.
11. That colleges should further strengthen graduate programs to produce qualified and talented teachers and researchers, and do so with the broadest possible utilization of the other departments and schools of the university; keeping in mind that not all colleges can, at this time, offer really Ph.D.-level work in all of the disciplines of pharmacy.
12. That deans and faculty members, with full consciousness of the professional stature of pharmacy, keep their eyes on the rising horizon, but never let their feet leave the solid ground where pharmaceutical services move the last thirty-six vital inches into the hands of patients and consumers.

And so it seems to me that education is squarely faced with the obligation to prepare future graduates for lifetime professional and intellectual growth, and to develop new and more effective means for protecting every pharmacist from his own self-destruction through frustration and obsolescence. Then, morale will climb to a high and satisfying level. In my view, these are the long-range objectives by which pharmaceutical education must be guided as it seeks to "meet the challenge of the future."

Perhaps I have been too bold in my predictions and suggestions, but I will have fulfilled my assignment if I have been provocative. I may easily find myself in the position of the Australian native who wanted a new boomerang, but could not get rid of his old one. But 2000 A.D. is a long way off, and it would not be fair to hold me to final accounting until that distant date. I take my comfort in the knowledge that I probably will not be around at that time.

SYMPOSIUM: SUPPLY AND DEMAND OF PH.D. PHARMACISTS*

INTRODUCTORY STATEMENTS

A. H. UHL

The problem of manpower at the Ph.D. level is but one of the several problems confronting the profession; however, I am of the opinion that it is one of our most difficult and one that can be solved only by the schools and colleges of pharmacy. The relationship between the supply and demand of these young men and women will be presented to you by the speakers who follow me, and I am sure they will prove to you that there is a real shortage of Ph.D. manpower. If the above statement presents the current situation and if the schools and colleges represent the source and supply of these young people, then it becomes our duty and obligation to do what we can to be of help in preparing more qualified personnel for the work they are trained to do.

What can we do as educators to expand the graduate programs in our schools and colleges? First, I suggest that we give consideration to the following basic prerequisites for graduate study and training: (1) an adequate faculty; (2) availability of supporting departments; (3) adequate physical facilities; (4) sufficient finances for equipment and supplies; (5) stipends for graduate students.

Faculties: I believe it is obvious to every one that a program of graduate study cannot be implemented without a faculty that has had training and experience in the area of research and teaching at the graduate level. I realize that this is not an easy task at the present time to bring together such a group of individuals. On the other hand, I believe that with patience and sincere effort it can be done. Perhaps it will take time and the cooperation of all of us, but if enough work is done, especially by the administrative unit of the college, results can be obtained. In building a research faculty we must not overlook our obligation to insist that undergraduate teaching is not being neglected. This does not need to develop in schools and colleges of pharmacy any more than it has in other university areas. In fact, I am one of those who feels that in order to do a good job of teaching undergraduate professional courses the teacher must, at the same time, be doing some research in the field for which he is responsible.

Young men and women trained in our graduate schools are prepared to enter into a teaching and research program at the graduate level, and it is from this group that we must find and develop our faculties. However, by the careful sifting of applicants for a given position, I, for one, have not hesitated to step outside our own schools for the type of research leadership I believe necessary to fill adequately the position. The Ph.D. men who are trained by our graduate schools of pharmacy must measure up in every way to Ph.D. men trained in other professional areas of the universities and colleges. To do this job there must be a strong corps of men on our pharmacy faculties.

Supporting Departments: To develop a well-balanced graduate program in our schools and colleges of pharmacy it is necessary that other departments be available in which the students can take courses that will give them background

*Presented to the Section of Teachers of Graduate Instruction, AACP, New York City, 1957.

material. The increase of new information in every segment of our scientific work requires that the material presented to our students become a composite of several different but allied areas. To build a faculty that is qualified in these supporting or complementing areas would be most difficult from a manpower as well as financial standpoint.

This same reasoning applies to the use of certain specialized equipment, which is now considered to be routine in many scientific procedures. Many universities and colleges are making available to all departments certain expensive instruments that are purchased by the university's central budget or from foundation grants, thus making available to all departments much equipment that they would not have otherwise. These and other services which can be shared by supporting departments help to make an aggressive and progressive graduate program in a school or college of pharmacy.

Physical Facilities: The space necessary to organize and develop a graduate program must be given serious consideration before an expansion program is undertaken. It has been estimated that each student doing research in the physical sciences should have a minimum of twelve feet of desk space. In addition, rooms must be available for specialized instruments. These rooms should be equipped so it is possible to control temperature, humidity, etc. There should be rooms set aside for extraction purposes which are specially prepared for use of volatile solvents. All this adds to the space requirements of the individual student. Physical facilities for research in the biological sciences are perhaps more demanding and expensive and should be well planned and developed before a program is undertaken. Along with the space requirements for the student, consideration must be given to the handling of supplies and equipment, availability of a machine shop and glass blower, and other auxiliary services. Thus, the demand placed on space for instruction in graduate research becomes a real problem in any graduate program.

Supplies and Equipment: I do not think it is necessary for me to tell any of you that the equipment necessary for research in pharmacy is different in every way from that of the other physical and biological sciences. If we in our schools and colleges of pharmacy are to do research at the same level as that done in other departments of universities and colleges, then it is necessary that we have the same kind and amount of equipment. We cannot do good research with instruments that are out of date, or what is even worse, when we are without them completely. The organization of a laboratory with sufficient equipment has been, and I suppose always will be, one of our most difficult problems.

Needless to say, equipment is not the only requisite for laboratory research. Many different chemicals, some common, some not common, some expensive, some not so expensive, are used in the routine work of the research worker. In our supply room of special chemicals we have over 900 entries, and I know we do not have all that should be there. I think I should point out that there is a difference between the needs for equipment and supplies for undergraduate and graduate instruction, and this fact must be taken into consideration when we make plans to offer graduate instruction.

Stipends for Graduate Students: Whether it is right or wrong, every young man or woman undertaking graduate study expects to receive a stipend. The amount of these stipends is fairly well crystallized within the given university and, I think, throughout the various universities and colleges of the country.

On an annual basis they have now hit at approximately $2,000. So far as I know, the money necessary to build up a group of graduate students is not obtained from the university's central budget except for those who are on the instructional budget as graduate teaching assistants. Therefore, in developing a program of graduate instruction it is necessary to obtain a rather substantial budget which is commonly referred to as gifts and grants. This pattern, which has developed over the years, seems to me to be one which will remain with us and one we cannot overlook if we in pharmacy are to be a part of the over-all program of graduate instruction.

I have endeavored to bring to your attention some of the problems relative to staff, physical facilities, supporting departments, and financial needs in building and maintaining a graduate school. It is satisfying to know that there is a demand for Ph.D. pharmacists, but if the schools and colleges of pharmacy do not tackle the problem of supply, the entire situation will remain static. I sincerely hope that all of us will do everything possible to help in the development of a sound program of graduate study for pharmacy.

In closing I would like to see a committee appointed by the AACP to study graduate instruction in schools of pharmacy following much the same pattern as that used in the recent study made by the American Chemical Society of graduate instruction in schools and departments of chemistry.

SUPPLY OF PH.D. PHARMACISTS

MELVIN W. GREEN

To people who have followed pharmaceutical education during the past decade or so it is clear that considerable progress has been made. Millions of dollars have been spent on new buildings, wings on old buildings, and new laboratory spaces. Scientific equipment has been added in a relative abundance, and libraries have been strengthened. A general improvement in the screening of students and in their subsequent promotion and graduation is evident. It is just as clear that the improvement in quality and quantity of staff is responsible for the more important phases of the educational program. The finest building, the largest collection of scientific and audio-visual apparatus, and the most select library in the hands of a mediocre staff can produce nothing but mediocrity. It is the human side of the equation that determines which way the equilibrium will balance.

Since the staff of the future is expected to come principally from those holding Ph.D. degrees, it is timely that the Section of Teachers of Graduate Instruction should hold a symposium on supply and demand. Supply and demand are essentially economic terms, and they have the same connotation in the teaching manpower field as they do in the larger field of economics. Our problem of manpower is a part of the larger problem of manpower generally in a highly complex civilization.

It is clear that there is a tremendous demand for well-trained specialists of all kinds in America today. Some think this is a rather temporary phenomenon caused by the war, the reconstruction, and a boom economy. Rather it would seem that we are only beginning to understand that one of the marks of a modern complex society is an insatiable appetite for educated talent. We need desperately all sorts of educated persons, and in the struggle to obtain these trained persons, the pharmaceutical sciences must stay keenly aware of the measure of the competition.

The question of supply is the topic I aim to discuss. Where will the teachers and research workers come from and how many are there? Probably the starting point for answering these questions should be a demographic analysis of the youthful part of our population. Lack of both time and skill prevents this approach. Instead, let us start with the flow of high school graduates into the undergraduate programs. It is these undergraduates that constitute the reservoir from which graduate students are chosen. This brings us back to the familiar theme song of quality recruitment. To a major degree the number of really capable people going into pharmacy from high school and from other institutions of higher learning has an important bearing on production at the graduate level.

There is a constant flow from the undergraduate school into the graduate programs. This flow is dependent upon many things: the state of the pharmaceutical economy, motivation, accessibility of graduate centers, the type and extent of subsidy for graduate education, personal factors such as marital and family obligations, and many others. Schools which have no graduate program constitute an important source of graduate students and have an obligation to stimulate students to continue their education. When undergraduates see little if any research activity in their surroundings, it is difficult to stimulate an appreciation for research and careers in research or teaching. Special problems courses, honors courses, senior research, and a close teacher-student relationship can be helpful in stimulating students to continue.

Today, scarcely any pharmacy graduate starts practice at less than $5,000 a year. There is much reason to rejoice at this in the minds of those of us who were pharmaceutically born during the depression, but this is not an unmixed blessing. In this day when a goodly percentage of graduates are married and may have families, if a graduate must make a continued financial sacrifice to obtain the doctorate and then take a teaching position at a rate scarcely higher than his practicing pharmacist classmate, either we are not going to attract enough graduate students or we may find ourselves concentrating on the incompetents.

There are now well over 600 graduate students in our total graduate program. By questionnaire I have learned that there will be about 100 Ph.D.'s in the pharmaceutical sciences available this academic year and next. Table I shows the breakdown of these Ph.D.'s according to areas of specialization.

TABLE I

ESTIMATED PRODUCTION OF PH.D.'S

Category	1956-57	1957-58
1. Organic Synthesis	31	35
2. Pharmaceutical Analysis	8	8
3. Chemistry of Natural Products	4	5
4. Pharmacognosy	9	5
5. Pharmacology	16	29
6. Pharmaceutical Research and Development	29	44
7. Pharmacy Administration	1	4
Probable Total	98	125

This shows that pharmaceutical chemists will be available in the greatest abundance during the next two years, pharmacists will run second and pharmacologists a close third. Pharmacognosists and specialists in pharmacy administration, probably the oldest and the youngest of the pharmaceutical sciences, are least in their productivity.

These figures are absolute figures and are used under the assumption that pharmaceutical knowledge exists in compact, water-tight compartments and that only a pharmacologically trained person can teach or conduct pharmacological research, for example. Such is not the case, however. Possibly persons trained in the field of plant chemistry make rather good pharmacognosists, if they have some additional biological training. Not only is cross-over of disciplines possible between the pharmaceutical sciences, but it is also possible between the basic and the professional sciences. Some of our most productive teachers and research workers have come to us from organic chemistry, physical chemistry, biochemistry, physiology, botany, bacteriology, and other basic sciences. In my own judgment the influx of persons who cross departmental lines is healthy when the men are chosen for their capabilities and adaptabilities. Some of our pharmaceutical sciences have become too static and have not arisen to the challenges of the times. To bring into such fields a new and fresh viewpoint is not only of value, but may be necessary. If we are not able to bring these fields into flower by traditional means, the fields will stagnate by default or else we shall have to catalyze them by adding those of other backgrounds.

Pharmaceutical chemists can come from organic chemistry, physical chemistry, pharmacy, biochemistry, and other fields; pharmacists can come from these same fields, especially physical chemistry as well as colloidal chemistry, pharmacology, and chemical engineering most logically. Plant biochemistry, mycology, plant physiology, bacteriology, and pharmacology seem like logical areas to find men for pharmacognosy. Many effective pharmacologists have entered the field from physiology, biology, pathology, and biochemistry. Pharmacy administration will have to be developed through business administration during the next few years if we are going to man the field with full-time personnel. This can be done by converting business administration persons into "pharmacists" or encouraging pharmacists to obtain advanced degrees in business administration until we have pharmacy administration graduate centers sufficiently strong in numbers and quality to meet the demand.

While I have spoken at some length regarding the less orthodox sources of supply, I wish to emphasize the conditional aspects of such sources. If pharmacy is to realize the real benefit from such persons, these scientists must be persons of distinctive ability and a high degree of adaptability. If these two characteristics are not in reasonable balance, frustration may result followed by nonproductivity.

I believe I would be remiss if I did not touch on the salary question in the teaching field. Salaries in pharmaceutical teaching have improved in dollar terms over the years. Relative salary improvement has not taken place in terms of living standards, and, in fact, the college professor has been losing ground, generally. It has been calculated that if a full professor were to live at the standard of 1939, he would need a salary approaching $18,000. To the best of my knowledge no pharmaceutical teachers are living in this rarified atmosphere. It is only fair to say that pharmacy salaries are in keeping with other university salaries, generally, and even somewhat above university averages not counting

medical school salaries. University teaching and scholarship has played too important a role in American civilization and economy to be relegated to the stepchild position. Every administrator has an obligation to take advantage of every opportunity to press for more realistic salaries. This is an important aspect of the question of supply that should not be overlooked.

THE DEMAND FOR PH.D. PHARMACISTS IN SCHOOLS

HAROLD G. HEWITT

Certainly we must be concerned with the problems associated with student population increases, the need for expanded facilities and more equipment for teaching and research, as well as curriculum studies. All of these problems must be pushed into the background until we find answers to our most critical need of obtaining and maintaining an adequate teaching staff. This is our problem today and in the foreseeable future.

If this need were solely limited to our profession, we might resolve it with ease. We are, however, competing not only with the tempting offers of other teaching disciplines, but with the tough competition of industry. The former would be difficult enough, but the latter is becoming progressively rougher. It does us no good to sit idly by and bemoan this fact: we must take some realistic and effective action at once.

It has been repeated many times over that "those who can—do, those who can't—teach, and those who can't teach, become deans." I will not argue the last point, but I shall strongly challenge the second part of this statement. As I have stated before, next to men of the cloth, the teacher is the most dedicated servant serving humanity today. With no pressure groups to make their needs heard, they have received far too little, for far too long, for their services.

Unless we adequately train modern youth in all fields, our science will deteriorate, our national economy will suffer, and our public health problem will become necessarily serious.

To turn the ability of modern youth into productive channels requires help and guidance in the home, through the church and in the classroom at all levels of training. To accomplish the latter requires well-trained, well-paid, and intellectually satisfied teachers. I am fearful of what lies ahead when I foresee the possibility that we may complicate our problem by turning out poorly trained teachers in our haste to man the ship.

We find ourselves on the two horns of a dilemma—on one "where is the college teacher coming from?" and on the other, "where is the college teacher going to?" Both problems involve that sordid thing called money.

The simplest way out of course is to marry a wealthy girl. This is becoming increasingly difficult as Uncle Sam has reduced this group to a small number, almost to the vanishing point.

As I outlined in my Presidential Address [*Editor's Note: See this journal 21, 193 (1957)*], we must find a way to increase teachers' salaries, improve fringe benefits, and offer conditions which will free our teachers and their families from financial worries over the future so that conditions for good teaching and scholarly productivity can flourish.

Those of us who have been teaching for some time rejoice at the starting salaries for new and inexperienced teachers and the salaries being offered our

brand-new Ph.D. recipients. We trust that this will continue with increases keeping pace with cost of living indices and with retirement features recognized.

We must see that we further the happiness which comes to dedicated teachers through adequate equipment, space to carry on their work, and a coterie of able graduate students. It is important that more postdoctoral fellowships are made available, that sabbatical leaves become more widely granted to allow for continued study at home or abroad, that exchange professorships between schools of pharmacy become more than something merely talked about, and that we find adequate assistance to relieve our teachers of some of the routine that weighs down their teaching loads.

When I reviewed the mail from sister institutions calling for teachers completing their graduate training, I was well aware of the needs for teachers. This last year I believe has brought more requests for help than at anytime in my memory. This is not I believe peculiar to our institution, but an experience common to most training centers for graduate students. In reducing these requests to percentages I found that 31 per cent of the requests were for teachers in the division of pharmacy, 28 per cent in pharmaceutical chemistry, 23 per cent in pharmacology, 15 per cent in pharmacognosy, and but 3 per cent in pharmacy administration. The first figure for pharmacy is not unexpected, but the last for pharmacy administration is surprising. These figures may not reflect anything but the fact that this is only the beginning, and we must face this manpower problem realistically.

The "fashion patterns" in training are interesting. A few years ago a great need for pharmacologists brought a large number of trainees to our graduate schools, then there was a clamor for pharmacy administration teachers, and now we have a desperate call for teachers in pharmacy and pharmacognosy. This results in an oversupply, and fewer takers are indicated. It is far beyond my power to find a solution, but we must find some answer to flatten out the crests and to raise the troughs of manpower needs. This I hope will be one of the dividends from the important studies going on in our Committee on Graduate Programs.

Not only do we face a shortage of teachers but the number of persons in the age group from which college teachers must be drawn will be declining at the very time the number of college students will be increasing rapidly. This is another debit which we can place on the ledger against World War II.

We felt that we must gain at least a gross idea of the numbers of advanced-degree recipients needed, not only for industry, but in our colleges as well. It is just as important that we know the demands in the divisions of pharmacy, pharmacy administration, pharmaceutical chemistry, pharmacology, and pharmacognosy. These needs were recognized by your Executive Committee, and such an assignment was given to the Committee on Graduate Programs under the able chairmanship of John E. Christian, along with John Nelson and Melvin Green. Their first report on their survey will be presented at the Second General Session of the AACP. [*Editor's Note: See this journal, 21, 247 (1957)*]. Through the kindness of Dr. Christian I was sent a copy of the IBM tabulation as soon as it was available. I shall try to relate some of this information to you in terms of our needs.

In Table I you will see that at the present time we are employing 455 full-time M.S. and Ph.D. candidates in our teaching programs.

TABLE I

TOTAL FULL-TIME EMPLOYEES AT THE M.S. AND PH.D. LEVELS IN OUR SCHOOLS OF PHARMACY

Division	Now	Needed in Next 5 Years		Per Cent Increase	
Pharmacy	190	117	(1)	61.6%	(6)
Pharmacognosy	52	45	(5)	86.5%	(3)
Pharmacology	61	52	(4)	85.2%	(4)
Pharm. Chemistry	103	77	(2)	74.7%	(5)
Pharm. Administ.	37	58	(3)	156.8%	(2)
Hosp. Pharmacy	12	35	(6)	291.7%	(1)
TOTALS	455	384			

The estimate which the Committee has made, based on the questionnaire, shows that we will require 384 new, full-time M.S. and Ph.D. teachers in the next five years. This is an increase in full-time staff of 84.4 per cent. The greatest needs, as you will see, percentagewise will be in hospital pharmacy, but numberwise will be in the division of pharmacy itself. In the order of increase in manpower needs after the division of pharmacy come those required in pharmaceutical chemistry, pharmacy administration, pharmacology, pharmacognosy, and hospital pharmacy. The breakdown as to degrees for trainees in the various divisions is in Table II.

TABLE II

ANTICIPATED NUMBER OF FULL-TIME PHARMACY GRADUATES NEEDED IN OUR SCHOOLS OF PHARMACY IN THE NEXT FIVE YEARS

Division	M.S. Degree Number	%		Ph.D. Degree Number	%	
Pharmacy	26	26.3%	(1)	91	31.9%	(1)
Pharmacognosy	9	9.1%	(6)	36	12.6%	(5)
Pharmacology	11	11.1%	(5)	41	14.4%	(4)
Pharm. Chemistry	21	21.2%	(2)	56	19.7%	(2)
Pharm. Administ.	14	14.1%	(4)	44	15.4%	(3)
Hosp. Pharmacy	18	18.2%	(3)	17	6.0%	(6)
TOTALS	99	100.0%		285	100.0%	

I only wish that I could have found statistics for pharmacy which would have given me the ratio of M.S. and Ph.D. candidates who have entered industry vs. those who entered teaching. I could not find this, and maybe it does not appear in printed form. The studies of our Committee on Graduate Programs may bring this to light. I hope so.

A twelve year study by a Commission established by the National Educational Association entitled *Higher Education in a Decade of Decision* has just been published. I recommend you get it and read every word. While the ideas are

not entirely new, there are some interesting facts contained in this report, and I should like to relate a few:

1. Instruction accounted for 43.6 per cent of total expenditures for higher education in 1929-30, but that the present figure is only 33.3 per cent.
2. Not more than one-fourth of those holding Ph.D. degrees join college faculties, the others go into industry. Half of this latter group have *starting* salaries from $1000 to $2000 a year higher than the salaries of their supervising professors.

Certainly such a state of affairs cannot continue if we are to "hold the line for teachers."

Since some of the M.S. candidates involved in the statistics of Table II during a five year period will have earned their Ph.D. degrees, we could not take totals of both degrees for a probable figure. Let us limit ourselves to the Ph.D. candidates expected, as projected from the past five year quotas and the numbers shown by the survey.

In the past five years in all of our schools of pharmacy, we have averaged fifty-six Ph.D. candidates a year. At this rate in the next five years we can expect at least 280 doctoral candidates. If this three to one ratio found by the National Educational Association holds, only seventy of these will enter teaching, and 210 will find their way into industry. But the Graduate Program survey shows that we will need 285 Ph.D. candidates in teaching alone. Where are the other 215 teachers coming from? It looks as though we will have to increase our numbers threefold to accommodate our teaching requirements.

I know that figures can be made to do many tricks and figures can lie or liars figure. It is fair to assume, however, that we are going to be far short of our needs for teaching, industry, and governmental services.

All I can say in closing is to repeat what I asked at the beginning, "Where are these teachers coming from?" Our graduate programs must be stepped up to meet the challenge, and we must enter into a vigorous recruiting campaign for students to meet these needs.

THE DEMAND FOR PHARMACY-TRAINED PH.D.'S IN INDUSTRY

RUDOLPH H. BLYTHE

How great is industry's demand for pharmacy-trained Ph.D.'s? How great will be the future demand? What is the opinion in industry of the quality of training received by pharmacy-trained Ph.D.'s in comparison to that received by Ph.D.'s trained in other scientific disciplines? This paper attempts to give at least approximate answers to these questions by drawing upon the results of two recent surveys.

In the fall of 1956, the Committee on Graduate Programs, under the chairmanship of Dr. John Christian, began a survey to discover industry's present and future need for pharmacy-trained men at all educational levels. While this survey was under way, I prepared a brief questionnaire similar to that used by the Committee but which concentrated on the need for Ph.D.'s alone. The questionnaire was sent to fifteen of the larger specialty manufacturing houses including three who also have a bulk medicinal chemical business. Most of the data used in this report were derived from this abbreviated survey, although some data and comments were supplied by Dr. Christian, and were based on information uncovered by the larger survey in progress at that time.

The figures shown in this paper are based on only those data revealed by the completed brief survey. Fourteen of the fifteen companies surveyed answered the questionnaire. These companies employ about one-half of all pharmacy-trained Ph.D.'s in industry; therefore, the actual number of job opportunities throughout the entire industry is probably about twice those reported in Figure 1.

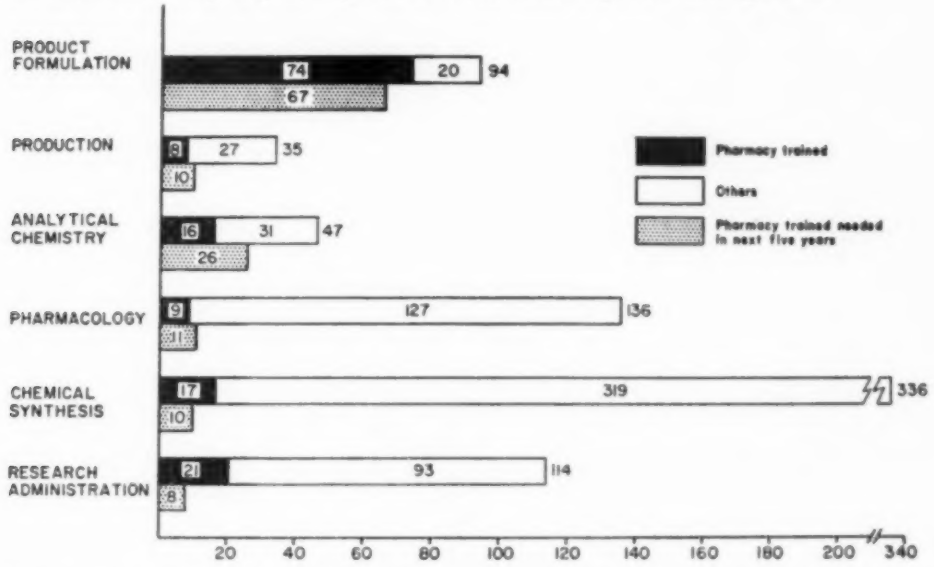

FIG. 1. PH.D.'S NOW EMPLOYED IN FOURTEEN COMPANIES (THESE COMPANIES EMPLOY ABOUT ONE HALF OF THE PH.D.'S IN THE PHARMACEUTICAL INDUSTRY) AND THE FUTURE NEED FOR PHARMACY-TRAINED PH.D.'S

Ph.D.'s Employed and Needed by Industry

The fourteen companies who answered the questionnaire currently employ 762 Ph.D.'s. One hundred forty-five of these men have been trained in pharmacy schools. These companies estimated that they will be hiring 132 pharmacy-trained Ph.D.'s during the next five years.

The largest number of pharmacy-trained Ph.D.'s are employed, and the need for more is greatest, in product formulation (pharmaceutical research). Nearly 80 per cent of the Ph.D.'s employed in pharmacy are pharmacy-trained men.

In all probability this percentage would have been substantially higher (possibly 90, or even 95 per cent) had we had a larger supply of graduate-trained men a few years earlier. Although a few companies set up departments devoted entirely to pharmaceutical research and product formulation in the 1930's, the bulk of the growth in this discipline has been through the 1940's and 1950's. During the early 1940's, few pharmacy-trained Ph.D. men were available. Even now, with greater numbers needed for industrial work, it appears from AFPE reports that approximately two-thirds of pharmacy-trained Ph.D. men go into teaching; about one-third into industry.

Considerable emphasis has been put upon manufacturing or industrial pharmacy by many of the schools in their graduate programs. I am not sure how much of this has been directed toward pharmaceutical research and product formulation and how much toward training for actual productions. Figure 1 shows that relatively few Ph.D.'s are employed in the production area, and that less than one quarter of these are pharmacy-trained. Most of the production work in pharmaceutical houses is handled by bachelor graduates who are skilled in production planning and supervision. The relative high percentage of B.S. men employed in production, as shown in Figure 2, may be accounted for by the fact that the more complex technical problems are referred back to the research or development laboratories.

I believe that pharmacy schools are giving inadequate attention to graduate training in the analytical field. Possibly neither the faculty nor the graduate candidate is aware of the opportunities and challenging work available to the Ph.D. analyst. Even so, about one-third of the Ph.D.'s employed in analytical work have been pharmacy trained. As Figure 1 indicates, this is the one area in which a significantly greater number of pharmacy-trained men are needed than are currently employed. I suspect that many of the men in analytical chemistry have been primarily trained in pharmaceutical chemistry and did not specialize in analytical work in their research problems. I hope that the schools will be able to put more emphasis upon this area in the future. I know that our personnel department at Smith, Kline & French has had more difficulty in finding analytical chemists than they have had in finding organic chemists. This figure also indicates that pharmacy schools have supplied only about 6 per cent of the many Ph.D. pharmacologists employed in industry, and that the demand for pharmacy-trained men is small in this field.

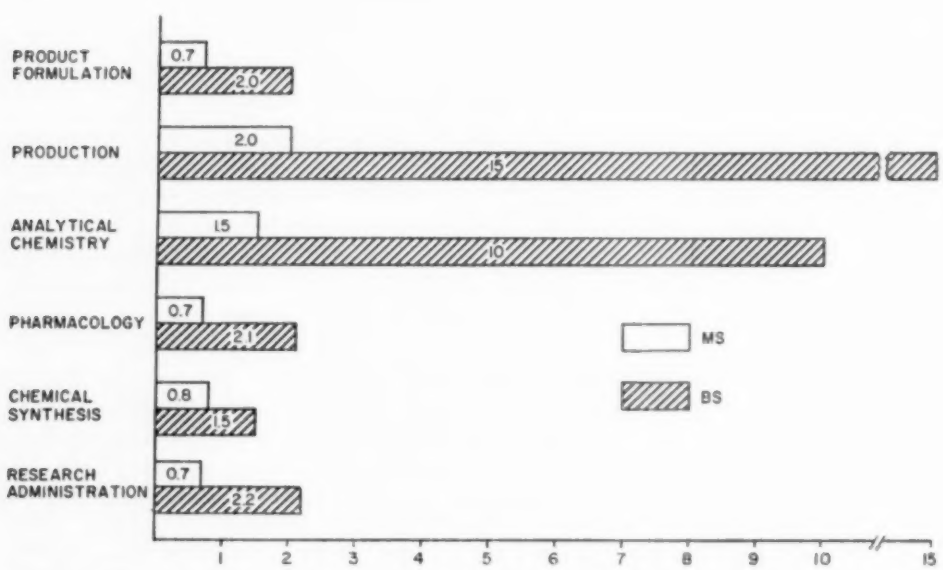

FIG. 2. RATIO OF EMPLOYMENT OF INDIVIDUALS WITH M.S. AND B.S. DEGREES TO THOSE HAVING PH.D. DEGREES

Figure 1 shows the large number of Ph.D. men employed in chemical synthesis. Many of these men are employed by those companies which sell bulk chemicals. The estimated future demand for Ph.D. pharmacy-trained men is quite small.

Research administration is another field employing pharmacy-trained Ph.D.'s. Several recent graduates have told me that they want laboratory jobs upon graduation, but hope later to transfer to administrative positions. There are two points that I should like to make regarding this: 1.) Research administration is growing into a discipline of its own, and some companies hire men directly out of school for this work. 2.) The currently popular belief that administration is the only way to more responsibility and more money is not as true as it may have been in the past. Many companies now recognize that they are wasting highly specialized creative talent by directing top scientists into administrative jobs, and so are offering equal opportunities for financial gain and company recognition within the specialized technical fields, rather than making it necessary for men to go into administration work in order to gain extra benefits. The man who seeks a laboratory job merely as a stepping stone may hurt his chances of being hired by some companies.

In looking over the estimated requirements for all the fields, we observe that 132 pharmacy-trained Ph.D.'s are needed during the next five years by the companies surveyed. Because this estimate represents approximately one half of the total number needed, the entire industry will need approximately fifty-two Ph.D.'s per year. Slightly over one-half of these will be needed for pharmaceutical research.

Ratio of M.S. and B.S. Men Needed per Discipline for Each Ph.D.

Although this discussion on personnel requirements was directed primarily for Ph.D.-trained men, I think that Figure 2 is useful in showing that there are good opportunities for bachelors and masters in industry. The first bar of each pair represents the number of M.S. men, and the second the number of B.S. men, desired for each Ph.D. These are averages, and the actual number wanted by one company may vary considerably. There is a particularly large demand for men with a bachelor's training in production and analytical work and to a lesser extent in research administration. These men must definitely have very special aptitudes and a strong motivation for this type of work, because it is realized that during a bachelor's training they cannot get specialization in these areas. B.S. graduates can improve their opportunities by taking evening courses and doing supplemental reading while employed.

It is not, then, essential that a man have a Ph.D. degree to succeed in industry, even in research work. Admittedly, the same man should go further and faster with formal graduate training. However, we must be careful not to direct the man entirely away from industry, or have him enter it with a defeatist attitude, if he has the desired personality qualifications but not a Ph.D. degree.

Academic Training and Personality Requirements

I have been somewhat concerned and disappointed during my school visits over the past twelve to thirteen years, in that there was a large percentage of men who had outstanding academic records but did not seem to have the type of personality that would be needed to do a good industrial job. In fact, some of the men with lower grades have much more likelihood of success. Industry

is a highly integrated operation, and all industrial personnel, whether working in research or elsewhere, must be able to present their ideas easily and clearly, and present them with sufficient enthusiasm to sell their associates on the ideas, whether these associates be fellow technical men or representatives of management. This ability requires an above-average amount of interest in, and compatability with, different types of people. Industrial research is very costly; industry itself is very competitive. Therefore, the best candidates for jobs in industry are those with excellent judgment and considerable initiative.

For fear that I might be inclined to lay too much stress on personality requirements, I decided to ask other people in industry how much consideration they gave to a potential employee's personality compared to the emphasis they gave his formal training. Figure 3 gives the answer to this question. As you can see, the specific course work a man has done is rated as nearly 50 per cent of his entire appraisal. The type of research project that he pursues is rated as only 18 per cent of the appraisal, while the candidate's personality has a rating twice that given to the specific research project. The average per cent placed upon personality was 36 per cent, but the spread in range was found to be from 20 to 60 per cent of the total evaluation.

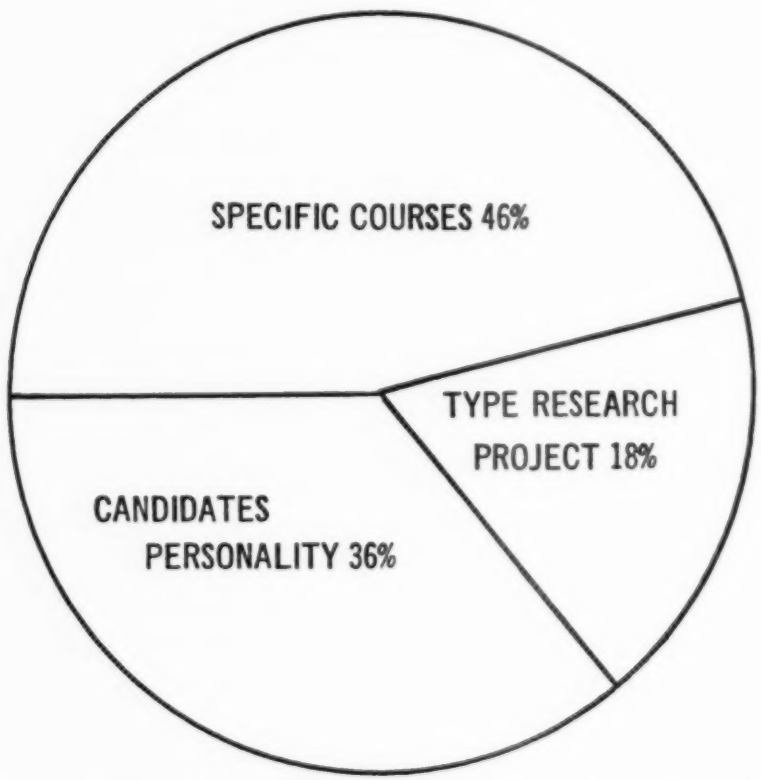

FIG. 3. INDUSTRIALISTS' VIEWS OF RELATIVE IMPORTANCE OF COURSE WORK, RESEARCH PROJECTS, AND PERSONALITY OF EMPLOYEES

I think that it is important that this be called to your attention. I have had many people tell me that if a man is an introvert he should go into the laboratory, and that if he is an extrovert he should go into sales or management. This may have been true when a research man was stuck off in the corner, but it is no longer true. I realize that it is extremely difficult to arrange interviews with prospective graduate students because of both the time and cost factors. However, if the dean recommending the B.S. or M.S. for further training were aware of the types of personality needed for different positions, he could consider personality requirements as well as academic achievement and ability when he makes his recommendations to the graduate school. It is also hoped that more consideration of the individual's personality could be given in the original screening of candidates for the bachelor's degree and again during their junior year when they are being counseled and given vocational guidance.

In addition to having the ability to work with people, the man best suited for work in industry should have an inquiring and analytical mind, the initiative and aggressiveness to start and finish jobs, and the judgment to know what to do when analyzing problems and results.

Recommendation Regarding Specific Courses

In Figure 3, we saw that most industrialists place more emphasis upon the specific courses that the man takes than they place upon other factors. There is a nearly universal feeling that pharmacy-trained Ph.D. men received an inadequate training in the basic sciences.

Figure 4 shows the emphasis that the various respondents place upon specific courses. I have chosen to divide the courses into four classifications: chemical, biological, pharmaceutical, and miscellaneous. It is somewhat surprising that only 14 per cent of the emphasis has been placed upon pharmaceutical subjects *per se*, while 63 per cent has been placed upon some aspects of chemistry with 21 per cent upon pharmaceutical organic chemistry itself (23 per cent if one wishes to include qualitative organic). Another 23 per cent has been placed upon physical chemistry, which far exceeds the emphasis upon

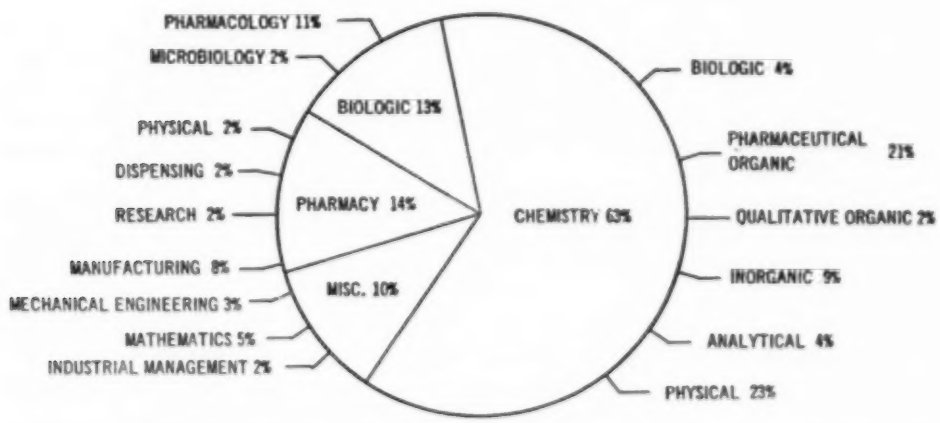

FIG. 4. INDUSTRIALISTS' VIEWS OF THE RELATIVE IMPORTANCE OF VARIOUS AREAS OF STUDY FOR EMPLOYEES

any specific pharmaceutical subject. Probably the emphasis placed upon mathematics takes into consideration the necessity of understanding mathematics before reaching an adequate understanding of physical chemistry.

I believe that dispensing pharmacy is included as an application of physical pharmacy. Our respondents felt that the students should have an appreciation of manufacturing pharmacy and medical engineering, probably because many of our new and improved dosage forms depend upon the application of mechanical principles as well as upon chemical principles. Furthermore, we can do a better job of formulating products if we have an appreciation of the techniques that are likely to be utilized in the ultimate production of the product.

The abbreviated questionnaire from which these data were obtained inquired about only those courses which the individuals felt were most important for jobs in *pharmaceutical research* and *product formulation* because the greatest number of pharmacy-trained Ph.D.'s are employed in these jobs, and because the people to whom the questionnaires were sent were best qualified to answer questions about the jobs. Additional detailed information is to be obtained later from the Committee on Graduate Programs' survey in which separate questionnaires were sent to pharmacologists, organic chemists, and laboratory directors, as well as to research and development pharmacists.

Opinions and Comments Received from the Survey

As I mentioned before, there was a nearly unanimous opinion that more emphasis should be placed upon the teaching of fundamentals and the various basic sciences which the Ph.D. could later apply to whatever problems he encountered. Figure 4 emphasizes the areas in which pharmaceutical research and development men feel that this emphasis should be placed.

Thirteen out of the fourteen research and development pharmacists who responded indicated that they preferred graduates of some schools to those of others and gave the following reasons why:

1. All agreed that some schools give a better training in the basic sciences, and that this training is essential.
2. Most stressed the need for training students in designing experiments and in interpreting data obtained from them.
3. The respondents believe that some graduate teachers not only have the ability to stimulate students more than other teachers, but also have the knack of developing the ability of the candidate to be resourceful and to think for himself. They believe that some graduate advisors err by directing the work too closely, and that others err by lack of contact with the student.
4. Preferred schools give a more rounded graduate education, partly because students associate with professors who have industrial contacts. Many pharmacy graduate schools suffer from an overly academic approach.
5. Some schools are able to give training in chemistry and pharmacology with specialists in the particular field.

The research and development pharmacists suggested the following ways in which the graduate programs could be improved.

1. All agreed on the importance of basic science courses for their own sake, and that they should be taught by highly qualified men.

2. More uniformity in quality of training from school to school is desirable. Emphasis should be placed on pharmaceutical research and physical chemistry rather than on synthetic and pharmacologic programs.
3. Nonpharmacy courses—particularly organic and physical chemistry—should be taught by nonpharmacy teachers.
4. There should be an increased emphasis on screening candidates for personality as well as for grades.
5. Courses in report writing and communications would better prepare men as future pharmaceutical executives.
6. Addition of part-time lecturers, selected from industry, would help to broaden the student's background in the newer developments.
7. It may be desirable to have university supervision and selection of research projects.

In addition to comments from pharmaceutical development men, I have obtained some comments from the Committee on Graduate Programs' questionnaire with the hope that it would explain, in part, why such a small percentage of Ph.D.'s doing pharmacology and synthetic chemistry obtain their training from pharmacy schools. These are the opinions of men who are recruiting scientists for their departments. Because they are opinions, they may be wrong; however, wrong or right, unfavorable opinions have the effect of lessening the pharmacy-trained Ph.D.'s chances for getting certain jobs. The consensus was that pharmacy students do not get the same quality of training in the specific basic sciences as do majors in those fields. Since most of the training at the Ph.D. level is carried out in state universities, it is my impression that these graduate students actually take the same courses as the chemistry majors. If the opinions of the respondents are wrong, there is a real need and opportunity for correcting this opinion through a public relations program. However, if these men are correct, it would seem that the schools should strengthen their teaching programs.

The following comments are those of laboratory directors or vice presidents of research for pharmaceutical houses:

1. There is a deficiency in knowledge in subjects such as organic chemistry, physical chemistry, and biochemistry. Often these courses are taught by pharmacists who are not qualified to teach them. Strict training in pharmacy perhaps should be limited to undergraduate training.
2. Chemistry units in pharmacy schools are inferior to those in schools of chemistry. Their basic weakness comes from the insistence of pharmacy schools in maintaining their own departments of chemistry and physical chemistry.
3. Sound training in organic and physical chemistry is lacking.

Next are three comments by directors of pharmacology or biologic sciences.

1. A close relationship is desired with medical schools to provide courses from the medical science departments.
2. Ph.D. education in pharmacy schools is given in an undergraduate atmosphere. Lack of a graduate faculty is a glaring weakness.
3. Ph.D.'s from pharmacy schools cannot compete with Ph.D.'s or M.D.'s from medical schools as far as pharmacology is concerned. This weakness could be overcome if the student would take certain courses in the medical schools; e.g., comparative anatomy, physiology, and pathology.

The following comments are from the directors of chemistry:

1. The Ph.D. should acquire the best available background in the fundamental sciences. He should be given courses taught in chemistry department for chemists, not watered down or specially orientated courses in pharmacy schools.
2. The organic chemist who is trained in pharmacy school cannot compare to a man trained in a chemistry school. The training required in the auxiliary sciences (e.g., pharmacology, pharmacy) is better learned "on the job." Weaknesses are both qualitative and quantitative. Few top-grade organic chemists are teaching in pharmacy schools.

An analytical chemist comments as follows:

Superior analytical training—which includes courses in advanced organic, qualitative organic, advanced physical, and advanced analytical—can be best obtained by the joint efforts of the pharmacy school and the chemistry school.

As I mentioned before, these are opinions. They are not necessarily right or wrong. However, they do suggest that forthright effort to study the needs and requirements of industry might well result in a greater supply of better-trained Ph.D.'s. I am sure that I can speak for my industrial colleagues, as well as for myself, in wishing success to and offering our cooperation in this effort.

Summary

Many pharmacy-trained Ph.D. men are employed in industry, with the largest number of these working in the area of pharmaceutical research and development. This work is becoming increasingly fundamental and complex. There appears to be a continuing need for pharmacy-school-trained Ph.D.'s with about twenty-five or more needed each year for pharmaceutical research and development, and an equal number in the other fields. Increased emphasis should be placed upon training these men in the basic sciences as well as screening them for personality characteristics before accepting them into the graduate school.

There are new opportunities developing for Ph.D.-trained pharmacists in fields other than laboratory work. These include opportunities for both chemically and biologically oriented men in the field of science information and administration, and for men with training in pharmaceutical chemistry to do patent administration work.

We can be justly proud of the history and contributions of our profession, but must not confuse age with maturity.

Troy C. Daniels, Am. J. Pharm. Ed., 16, 546 (1953)

PANEL: TEACHING OF PHYSICAL PHARMACY AT THE UNDERGRADUATE LEVEL*

THE SCOPE AND PREREQUISITES FOR THE UNDERGRADUATE COURSE IN PHYSICAL PHARMACY

ARNOLD D. MARCUS

The scope and prerequisites of a course which has been the center of as much discussion as physical pharmacy must, themselves, be items of similar serious discussion. At the same time, however, it is apparent that the need for a separate course in physical pharmacy, *on the undergraduate level,* has received such wide recognition that the controveries of the past need not be repeated. We must recognize, however, that much of the difficulty experienced by physical pharmacy resulted from the prerequisites which were recommended by Blauch and Webster (1) and by many proponents of offering physical pharmacy on the undergraduate level.

It is axiomatic that the scope assigned to any course must depend upon the prerequisites. Since the prerequisites which can be set at the present time differ greatly from college to college, we should recognize that, for a while at least, the *caliber* of physical pharmacy courses will also vary. While this is hardly a desirable situation, it is by no means something new to our curricula. Organic chemistry courses in our schools and colleges vary in the level at which they are presented; so do courses in pharmaceutical technology, organic medicinals, pharmacology, and others. We do not throw up our hands in despair nor do we dogmatically insist on a uniform set of standards to be agreed upon at once. Instead, we recognize that the differences exist for the moment, and we continually strive towards somewhat of a uniform ideal. The same should be done in the case of physical pharmacy.

If, however, progress is to be made we cannot allow courses designated "physical pharmacy" to vary "all over the lot" for all times. We, too, must strive towards the ideal. For this reason, I have organized my remarks so as to present what I feel to be ideals of prerequisites and scope. I shall also attempt to point out, and evaluate, those factors which may impede realization of the ideal, but, and I regard this to be most important, my vital concern will be in establishing basic minima for both prerequisites and scope.

If we accept as a very vague and general definition that, "physical pharmacy concerns itself with the application of basic principles of physics and physical chemistry to pharmaceutical systems and problems," we can begin to consider what scope and prerequisites may logically be called for. Let us consider the prerequisites first.

In discussing prerequisites, we must differentiate between those which could be called for in the present curricula and the additional prerequisites which will be permitted by the lengthened curricula. The two are not, and must not be considered, the same. Our four year curricula are such that we cannot require certain essential prerequisites. It would be wise for us to recognize immediately that only a considerably watered-down course in physical pharmacy can be

*Presented to the Section of Teachers of Pharmacy, AACP, New York City, 1957.

offered to students who are largely ignorant of elementary calculus and beginning physical chemistry. Despite this liability, the advantages to be gained by a course in physical pharmacy are of sufficient weight to require improvement rather than apology. When the five year sequence becomes mandatory, however, we would find it quite difficult to excuse or explain away a watered-down course. The *barest* prerequisites for a course in physical pharmacy in a *four year sequence* should include: organic chemistry, a year of college physics, qualitative analysis, quantitative analysis, and a year of mathematics which could honestly be called "college level."

Unfortunately, not all of our schools and colleges of pharmacy can meet even these *minimum standards*. Some of our curricula do not include a full year of college physics. This deficiency can, quite fortunately, be remedied without too much difficulty. It will be much more difficult, however, to meet the mathematics requirement. Kearns (2) has shown quite clearly that in many colleges the mandatory course in mathematics represents little more than *high school* algebra and trigonometry. Unless our students possess a more complete mathematics background, it is largely futile to offer a course in physical pharmacy. Without a thorough knowledge of at least *college* algebra, the heart of a physical pharmacy course, its *quantitative* character, must be sacrificed for an essentially descriptive offering.

Inasmuch as the time is rapidly approaching when the extended curriculum will become mandatory in all of our schools and colleges, it would be well to examine the prerequisites which should be set at that time. Actually, most of these have already been enumerated. Despite this, we now reach a point which has become the bone of greatest contention—physical chemistry. I wish to state without qualification that if the ideal situation referred to previously is ever to be achieved, we must work towards a prerequisite of *six didactic hours* of a *usual course in physical chemistry* as given by a chemistry department to chemistry majors. Although some may criticize this as far too demanding, others may ask (tongue in cheek?) why no mention is made of laboratory instruction. My only possible honest answer is, that such a prerequisite would find too much time devoted to a mandatory technical area whereas the principal benefits to be derived from lengthened curriculum are to stem from nontechnical subjects, the liberal arts. The didactic instruction in physical chemistry is often given as separate from laboratory instruction. It is no doubt felt that where time does not permit physical chemistry, *in toto*, there is a substantial benefit still to be gained from the lectures alone.

In truth, physical chemistry as a prerequisite for a course in physical pharmacy receives much undeserved criticism. It is my sincere opinion that most of the misgivings stem, not from physical chemistry, *per se*, but rather from the prerequisites associated with it. The fact that at least one semester of calculus is necessary for the study of physical chemistry is the source of most of the difficulties. Of course, the usual co-requisite of the second semester of calculus does not help the situation. If it were possible to offer a standard course in physical chemsistry without these pre- and co-requisites, much opposition would disappear. It is common to hear statements to the effect, "I have nothing against physical chemistry, but I'm certainly against requiring calculus." Such attitudes do not consider that a proper understanding of physical chemistry is virtually impossible without a knowledge of elementary differential and integral calculus. If the ideal is ever to be achieved, it is vital that a physical chemistry

course *with the usual pre- and co-requisites* be made prerequisite for the study of physical pharmacy.

We all realize that the prerequisites enumerated above are virtually impossible in a four year curriculum. Indeed, it will require a significant advance in the level of mathematics to make these prerequisites possible even in the five year curriculum. A compromise plan must evidently be sought to fill the gap between the onset of the course and a more ideal situation. In making such a compromise, however, we must be careful not to set our standards too low. That is, we should not place ourselves in the position of doing away entirely with some calculus as a prerequisite for physical pharmacy. Similarly, we should not attempt to satisfy the physical chemistry prerequisites with a course which is so watered-down as to provide little more than superficial and qualitative treatment. It is, therefore, quite disturbing to hear many reports to the effect that once the five year curriculum becomes manadatory, physical pharmacy, as a separate course, will be required of all students but that there will be no calculus prerequisite and that the physical chemistry prerequisite will be satisfied by a nonmathematical course such as is often required of premedical students. It is unreasonable to expect a satisfactory course in physical pharmacy to rest on so flimsy a foundation.

What, then, should be the minimal mathematics and physical chemistry prerequisites for an undergraduate course in physical pharmacy in a five year curriculum? There have been numerous suggestions, and I have discussed them in detail with many of you. As a result of these discussions, and after careful thinking on my part, it is my conclusion that in those situations where it is either impossible or impractical to require the usual didactic instruction in physical chemistry immediately, the suggestion put forth by Higuchi (3) may serve as the most satisfactory compromise. This suggestion, which was considered at the 1956 meeting of the Section of Teachers of Chemistry, proposes the following. ". . . a four to five credit course in physical chemistry for the pharmaceutical curriculum. Two credits are to take the form of quiz sections meeting twice a week and devoted to introducing the students to such higher mathematics as would be required. Lectures on physical chemistry would make up the rest of the credits . . . ." ". . . a rigorous basic course in physical chemistry for all pharmacy students . . . with thorough mathematical and theoretical treatment of elemental concepts. Theories of gases, liquids and solids, thermodynamics; and the physical chemistry of chemical equilibria both in homogeneous and heterogeneous phases . . . ." ". . . such differential and integral calculus that may be required can easily be taught in less than ten classroom hours, *provided the students have an adequate background in algebra*" (italics mine). "Differentiation of x^n and ln x and corresponding inverse processes are all the calculus we need to cover the basic material. This limited amount of calculus would, however, provide a firm and sound foundation . . . ."

Perhaps Dr. Higuchi has more faith in the ability of undergraduate students than I. My experiences make me doubt that only ten hours will be sufficient to cover the necessary mathematics. In addition, I am not optimistic enough to feel that the time allotted will permit a proper consideration of that portion of physical chemistry necessary for the study of physical pharmacy. I do believe, however, that Dr. Higuchi's proposal represents an excellent *starting point*. With this foundation it should not be too difficult to strive for, and reach, the ideal.

In speaking of the scope of the undergraduate course in physical pharmacy, I assume that each student will have the minimum background described previously. In addition, I shall be referring to the scope of a course given as part of a five year curriculum. This attitude may be criticized as neglectful of the years during which most colleges will remain on a four year curriculum. I believe, however, that the difficulties of presenting a truly worthwhile course in the shorter program are so great as to require a far keener analysis than mine to establish the scope of the course. Also, the four year offering is so quickly coming to an end that our efforts will reap greater dividends if applied to the future rather than to the present.

Though one may, in speaking of the scope of a course, legitimately include both course content and course objectives, I do not wish to infringe upon Dr. Biles' remarks. Similarly, I feel that the objectives of the course in physical pharmacy have been spelled out by Blauch and Webster. I can add little or nothing and suggest few, if any, changes. Instead, I shall attempt to say quite briefly what the course should *not* be. I shall also indicate my general opinion as to the desired level of the material covered.

In the original paper by Busse (4), it was stated that physical pharmacy should occupy some sort of terminal status and, therefore, included pharmaceutical preparations as a prerequisite. I cannot concur in this view. I feel that physical pharmacy must be the *foundation* upon which *all other pharmacy courses are built*. I certainly stand opposed to the suggestion made by Martin (5) that physical pharmacy be given before physical chemistry and that it be combined with pharmaceutical technology to suit the needs of individual institutions. I think, however, that Dr. Martin was referring to a four year sequence rather than five.

It is most important to make certain that the physical pharmacy course does not become a refuge for material covered at one time in the fundamental principles offering. This danger becomes of increasing concern as the "principles" course gives way to "orientation" in its various forms. Physical pharmacy has a content legitimately its own and should not be disrupted nor diluted with displaced material. Physical pharmacy can serve us best by opening new views towards solving and/or understanding new and old problems. It must be a continuous and logical sequence, not a hodge-podge of topics which belong to general chemistry, introductory physics, or pharmaceutical calculations. Since physical pharmacy should come as early as possible in the program and should *precede* preparations, technology, and dispensing, the urge to make it a "blown-up" course in "fundamentals" may be great, but that urge *must* be resisted.

An equally important facet of the scope of a course in physical pharmacy is the level at which the course content is pitched. Certainly, a course which requires organic chemistry, qualitative and quantitative analysis, college physics, mathematics through introductory calculus, and physical chemistry (more or less) must make full use of these prerequisites. The student must be required to understand, and apply, the content of these prerequisites. The course content should consist largely of *new material* or *new applications*. It should not be a rehash or review of the old. In the same vein, the treatment of the subject matter should be theoretical and quantitative rather than descriptive. The presentation should be such that the student will be taxed to put forth his best

possible efforts. If this is done, all of our discussions will have borne fruit, and the importance of the prerequisites will be obvious even to the students.

In addition to these views on the scope of a physical pharmacy course, one more should be at least implicit. The instructor responsible for physical pharmacy must make every effort to consult and work closely with his colleagues responsible for the more applied offerings. In this way physical pharmacy will truly be able to serve as a foundation for all other offerings in pharmacy.

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PLANNING COURSE CONTENT TO ACHIEVE THE OBJECTIVES IN THE COURSE IN PHYSICAL PHARMACY

JOHN A. BILES

At the Pharmacy Teachers Seminar held in Madison, Wisconsin, in 1949, a course in physical pharmacy was proposed (1). A course in physical chemistry was discussed (2). The course in fundamental principles and processes was challenged. I concluded at this meeting that some of the professors believed that the area of pharmacy emphasized the art and skills—perhaps overlooking the scientific aspects. One professor stated that he could not justify a Ph.D. with a major in pharmacy. One of the deans further suggested that any Ph.D. thesis in the pharmacy division would be either a physical chemical or a pharmacological problem.

Now, eight years later, the pharmacy educators are trying still to include in or develop for the curriculum a course in physical pharmacy. Some professors have argued that this material could be integrated in other courses. However, my sentiments on this argument at the present are those of Goyan (3) who said that "the best method of teaching the essential applications of physical principles to pharmacy is to provide a required course . . . for undergraduates in colleges of pharmacy. Although it is impossible to attain the same objectives by other means, there is grave danger that instruction in fundamental physio-chemical principles offered incidentally in other courses may be lost to all but the exceptional student. The average student tends to concentrate his study on those phases of a course that seem most likely to contribute largely to the examinations, taking a calculated risk that a minor, though difficult, part of the general course may be overlooked with impunity."

In planning the course content to achieve the objectives in physical pharmacy, three considerations should be analyzed. First, what are the objectives? Second, what are the teacher and student attitudes and abilities? Third, what should be considered in the course content?

Objectives for the course were stated by Busse (4) and affirmed by Blauch and Webster (5). Martin (6) has also listed objectives. I cannot say that the objectives of the physical pharmacy course at the University of Southern California are unique. Three objectives were established, namely: (a) to eliminate the empirical approach to the learning and teaching of pharmaceutical principles; (b) to motivate the student to think creatively so that he will be able (c) to apply the physical-chemical properties to the pharmaceutical systems. The third objective was used by Busse (1) to define physical pharmacy.

Do not worry about the name of such a course which carries these objectives. Call it fundamental principles and processes, theoretical pharmacy, physical pharmacy, product development, or some other chosen title. Furthermore, it matters little what division the course(s) is placed in.

Having defined the objectives, consider now the attitudes and abilities of the teacher and student. It is pertinent that a qualified individual should teach a course with the above-mentioned objectives. I believe that a minimum requirement is the discipline of mathematics through the calculus and eight to ten semester units of physical chemistry as required of chemistry majors. If this be the minimum, it is certainly suggested that additional course work in the physical chemical sciences be undertaken by the teacher either through independent study or through formal course work. The teacher should have an appreciation of the problems that are encountered in pharmacy. With this appreciation, the teacher, in his presentation of material, will direct his attention to pharmaceutical problems.

The level of teaching will be determined to some extent by the prerequisites. One of the primary considerations in determining prerequisites is the ratio of the unit credit of the fundamental physics, chemistry, and mathematics courses to the total unit credit in the pharmacy curriculum. If the ratio is too high the elective courses in the humanities will suffer. This, in effect, is decreasing the value of an extended program. For this reason the University of Southern California pharmacy faculty concluded that an elementary three-unit course in physical chemistry offered by the chemistry department should be the prerequisite to the physical pharmacy. Furthermore, the physical pharmacy course was placed in the second year of the pharmacy curriculum so that the knowledge gained, it was hoped, would be applied to all pharmacy courses in the third and fourth year. In this manner the objectives would be more effectively achieved. The approach to pharmaceutical problems via the scientific route would begin at an early period. It is the author's opinion that, whether the course is taught in the second, third, or fourth year of the pharmacy curriculum, the teaching level will be approximately the same.

In the development of a successful course the teacher must recognize the student's ability and attitude. The teacher can control the attitude rather easily because the theory becomes an exciting challenge if the student knows what he can do with it. It is imperative, therefore, to apply the theoretical discussion to a pharmacy problem that he will likely encounter in the pharmacy.

It has been stated that identifying one's own interests with a designated activity is motivation. The learner must identify the material to be learned with a recognized need for it. This recognized need may be identical with the objectives. "The learner must be convinced of the worth of the materials *to him*. Obviously this means the material must be as close to reality as possible at the present time" (7).

What are the chances of motivating the student in the study of the "physics of tablet compression" if the material is not applied to disintegration studies of compressed tablets? If this theory and this application are correlated, the student will handle and examine with pride or criticize constructively the compressed tablets that he makes or dispenses. A second example is warranted to illustrate the role of physical pharmacy. There is ample evidence to show that the hydrolysis of lactones is a function of pH. Apply this information to the consideration of the stability of pilocarpine (a lactone) in aqueous solution. Too many physicians and pharmacists believe that all pilocarpine solutions are not stable. It is inexcusable for pharmacy students to graduate today without an awareness of the factors causing the hydrolysis and inactivation of esters, lactones, glycosides, etc.

The student's attitudes toward and abilities in mathematics, physics, and chemistry must be recognized. The author admits that the student's discipline in these sciences leaves something to be desired. Teachers of physical pharmacy must recognize this condition, or their teaching will be at too high a level and the student's response on examinations will be at a low level. The teacher must never forget that much of the material which he presents has been turned over in his own mind many times and that the student is confronted with the material for the first time. The odds are not in favor of the student conquering and retaining the material the first time it is presented.

In developing the course outline, the author was influenced by two factors, namely: (a) discussions of such a course at seminars and district meetings and (b) deficiencies exhibited by students at four different institutions located throughout the United States. The author concluded that the pharmacy graduate was unable to show that the structure of any drug had considerable meaning to him. This shows a definite lack of the understanding of the problems encountered in the development of an acceptable dosage form. Please understand that this lack of understanding is not only directed to problems encountered by pharmaceutical manufacturers, but also to problems encountered in the compounding of prescriptions.

It is very desirable that the pharmacy graduate today should be able to answer many of the following questions when the structure of a drug has been examined. What are the functional groups of the drug? What effect do the groups have on the solubility in different solvents? How is the solubility affected in aqueous solution with varying pH? What governs the solubility in solution with respect to temperature? Can the crystalline structure and physical properties of the drug be related to the solubility? Does the particle size of the drug govern the rate of solution and rate of biological absorption?

How can the stability of the drug be predicted from the chemical properties of the functional groups? Will the drug in solution be oxidized or reduced, and what procedure is taken to counteract this chemical reaction? What groups will absorb ultra-violet light and how does this affect the stability?

Should the aqueous solution of the drug be buffered? If so, what is the logical buffer to use and what should the capacity be? These questions illustrate only a few of the problems of a physical chemical nature.

The content of a course at any institution will not be properly developed unless the teacher has an excellent picture of the prerequisites in addition to the course content of the different pharmacy courses. Many articles have been printed concerning the course content in physical pharmacy (1-6, 8, 9). The

course outline developed at the University of Southern California was patterned after the general topics discussed in the course in physical chemistry. The major topics were classified as follows: (a) physical properties of pharmaceuticals (analogous to the three states of matter discussed in physical chemistry), (b) properties of homogeneous solutions (analogous to the study in physical chemistry of solutions of nonvolatile solutes, chemical and ionic equilibria), (c) properties of heterogeneous solutions (analogous to a study of phase diagrams, colloids, and emulsions in physical chemistry), and (d) application of chemical kinetics to the development of a proper dosage form.

In the study of the physical properties of pharmaceuticals the student will again gain a better understanding of the different types of bonding, packing in the crystalline state, the functional groups in the molecule and molecular weight as it affects the properties. In the proper development of this material it is suggested that the incompatibilities of inorganic and organic compounds as presented by Busse (1) and Wurster (11) be studied. A discussion of the physical constants and solubilities of organic compounds is found in any acceptable qualitative organic textbook. Recent literature is available concerning the solubilities of organic pharmaceuticals in aqueous solution of varying pH (12, 13).

Goyan (14) has treated the properties of solutions of electrolytes as related to adjusted solutions. Discussions of buffers in textbooks of quantitative analysis are very helpful, as well as physical chemistry texts.

In the adequate development of the topic of heterogenous solutions, Higuchi's discussion of colloids is useful (15). There are many acceptable texts and recent publications in American and British pharmaceutical literature on the properties of emulsions. Studies of colloids are available. One good example of application of the preparation of colloids is the use of the von Weimarn equation (16). This can be applied to the mixing of two pharmaceutical solutions with a prediction of minimum or maximum precipitation and the particle size of the precipitate. This, incidentally, may cut to a minimum the memorization of how two different pharmaceutical systems should be mixed to obtain a satisfactory mixture or true solution. The recent work of Higuchi *et al* (17) concerning the interaction of polyelectrolytes and drugs should be included.

Also the partition coefficient should be discussed critically. An excellent application is the Ferguson Principle (18, 19). The work of Busse, Higuchi *et al* (20) concerning the study of the hydrolysis of esters as a function of pH and temperature is available. Additional kinetic studies have been published (21, 22).

It is impossible to discuss all that should be included in a course in physical pharmacy. If it were possible, I doubt its practicability. It takes much midnight oil to develop a sound course. But in so doing the teacher will have a greater appreciation of the course, and this will undoubtedly rub off on the student.

When such a course is taught in the curriculum for a given period of time, other courses will be strengthened. Then, perhaps, the scientific approach will be taken in all courses. Then the demand for a formal course in physical pharmacy will disappear because our educational program in the pharmacy area will have become sound. Then we can look our critics in the eye and say with confidence that pharmacy is not the weak link in pharmaceutical education.

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PROBLEM SOLVING AND CREATIVE THINKING IN THE PHYSICAL PHARMACY LABORATORY

ALFRED N. MARTIN

The Committee on Curriculum of the American Association of Colleges of Pharmacy, in its 1956 report, recognized the importance of physical (theoretical) pharmacy in the undergraduate curriculum. It suggested that the course carry a minimum of four credits with the advisability of laboratory instruction to be decided by the various colleges. The Committee further recognized that two

schools of thought existed with regard to the prerequisites, objectives, and scope of the course. Since the desirability of laboratory instruction, and the type of experimentation, will depend largely on the purpose and the level of the physical pharmacy course in the curriculum, it is necessary to consider these two approaches to the subject.

The first plan recommends calculus and statistics, and a course in physical chemistry, as prerequisites for physical pharmacy so as to correlate the principles and methods of mathematics, physics, and chemistry. This sequence may be possible and desirable in the extended curricula of some schools; however, it may necessitate eliminating some elective credits in general education and the professional options, which would not be wise for all students and would not be in keeping with the primary objectives of the five year program.

The second plan suggests college mathematics, physics, organic chemistry, and quantitative analysis as prerequisites, without a demand for calculus and physical chemistry. Such a course in physical pharmacy, although it would not be equivalent to a course based upon calculus and physical chemistry, would provide the needs for students interested in retail and hospital practice. Students in the research option as well as those in the professional area who were interested in the advanced theoretical aspects of pharmacy would then take calculus and a standard two-semester course in physical chemistry in preparation for the physical pharmacy courses in the graduate program.

The nature of the laboratory experiments will depend on which of the above two principles the various colleges of pharmacy follow. The character of the course will also be determined largely by the inclination of the majority of the students in the class. A course designed primarily for students interested in retail and hospital pharmacy would emphasize experiments in the preparation of buffers, the adjustment of isotonic solutions, the properties of suspending agents and pharmaceutical bases, and the decomposition and stabilization of drug products. Laboratory experiments for the research-minded students would include the determination of thermodynamic properties, such as activity coefficients and dissociation constants; the study of solubility, solubilization, and the formation of molecular addition compounds; the measurement of particle size and specific surface; the investigation of physical chemical properties of powders in various loose and compacted forms; and the kinetics of degradation.

The writer has found that when physical pharmacy is pitched on an intermediate level it may well be united with pharmaceutical technology to provide a two-semester course. The theoretical aspects of each topic are followed by a discussion of technology and practical applications. The laboratory perhaps serves its most useful function in a course of this type. In a curriculum where physical pharmacy is preceded or followed by physical chemistry, many of the experiments are better carried out in the physical chemistry laboratory, and some schools that subscribe to this program may find no additional need for laboratory work in conjunction with the course in physical pharmacy.

Some representative laboratory experiments for an integrated course in physical pharmacy and technology were included in a report delivered before the 1955 Teachers' Seminar on Pharmacy and appeared in the Proceedings of that meeting. The design of a laboratory for physical pharmacy or physical chemistry in the pharmacy school is the subject of a separate report; it will be presented elsewhere. The fundamental purpose and the philosophy which determine the type of laboratory instruction in physical pharmacy are appropriate

topics for the present report.

Concepts and Methods in Experimental Physical Pharmacy

As Dr. Green pointed out in his summary following the 1955 Teachers' Seminar on Pharmacy, a new way of thinking and experimenting—a quantitative and a physical way—has recently been introduced into the profession of pharmacy. This move away from the descriptive and observational to the theoretical-experimental approach should find some of its greatest manifestations in the physical pharmacy laboratory.

Laboratory work should be designed not only to teach techniques, but also to encourage logical and creative thought. Whereas the student in his first and second year of college should concentrate on preparing pharmaceutical products conforming to an accepted standard of elegance, in the upper-level courses he should rely more on his own judgment and should practice new approaches to the solution of pharmaceutical problems. Thus as the student matures intellectually during his college career, he changes from the imitator to the individual thinker.

Physical chemical principles, which are presented in other courses as well as in physical pharmacy, are all too often vague and unreal to the student, and he does not see how these fundamentals can be applied to the practice of pharmacy. The laboratory provides a suitable arena where the student can step out of his classroom role of spectator and into the position of participator. In the laboratory the student improves upon his manual techniques, becomes familiar with modern research instruments through demonstrations and actual use, and checks for himself certain facts and principles which have been presented in the lecture. Probably most important of all, the laboratory serves as a common ground where theory and experiment can be united and where the problem-solving method can be demonstrated in a most meaningful way. The remainder of the report will be devoted to this important aspect of scientific training.

The Problem-Solving Method*

If we accept the premise that the preponderance of scientific activity involves the confronting and the solving of problems, then the time spent in formal education should be devoted not only to an accumulation of facts and techniques, but also in large measure to practice in problem solving. Unfortunately, the teacher often leaves the methodology of problem solving solely to the student. "I cannot be expected to think for the student," we sometimes hear the teacher say. Such a statement is extreme, for it overlooks certain established principles of educational psychology. It is certainly true that the teacher cannot think for anyone else, but he *can* certainly assist the student in the classroom and in the laboratory to observe more critically, analyze more carefully, deduce more logically, and reach conclusions based on the sound application of facts and principles.

The teacher can often present much of the lecture in the form of problems to be solved rather than as irrefutable facts to be memorized, and the student, in attacking and solving such problems, will see, perhaps for the first time, the relationship among otherwise unrelated facts. An interesting method of

*Problem solving here does not refer specifically to the solution of mathematical problems, but to the broader attack on all types of scientific questions.

instruction that warrants more study and trial is that involving the participation of small groups of students in the solution of the problems. When the lecture and recitation classes are conducted according to these approaches, learning often takes on a new radiance for teacher and student alike.

The Application of the Problem-Solving Method to Laboratory Instruction**

Is there really an ordered array of steps to the solution of a problem, a recipe that we can give our students for conducting experiments in the laboratory? A number of philosophers and scientists, probably the most famous of whom was Aristotle, have suggested that there is such a scientific method.

In recent year some thinkers have deprecated the method. They feel that the advancement of science is the result of the "hit-and-miss" use of brains and brawn with no holds barred. According to Darlington, an English geneticist, science does not roll ahead like a steamroller, breaking down problems with a uniform force. It is better represented by the pulling out of a drawer which gives on one side only to jam on the other.

The real condition probably lies somewhere between these extremes, and for the purpose of this presentation it is convenient to accept a compromise description of the problem-solving method. Accordingly, the investigator begins most likely with inexact casual observation and a number of untested "hunches." Following preliminary experimentation, coupled with library work and inductive and deductive reasoning, the program passes through a succession of increasingly ordered stages. Tentative hypotheses are formed, and when one of these finally compares favorably with observation and controlled experimentation, the problem is said to be solved.

The following example is given to show how some of the experiments in physical pharmacy may be carried out to demonstrate the scientific approach and to provide an opportunity for critical thought and problem solving in the laboratory.

Following the lectures on ionic equilibria and solubility phenomena, the following problem is presented to the students in the pre-laboratory discussion period.

> You are handed a prescription containing a 5 per cent solution of sulfathiazole sodium in a pH 8.0 borate buffer. (The teacher passes several samples of the preparation among the group.) What do you notice about the product? What do you think the precipitate is due to? Can you suggest a way to correct it?

After the students have accepted as the most plausible hypothesis that the precipitate is either the result of a lack of solubility of the drug at this pH or an incompatibility between the drug and a borate buffer, the next step involves the development of an experimental program which will prove or disprove these working hypotheses. The students first consider making up the solutions with different buffers and at several pH values and observing which samples show no sediment. However, after the teacher points out the dangers of this narrow approach, the group can be encouraged to introduce an excess of sulfathiazole into 50 ml. portions of buffer solution at various pH values, and determine the solubility of the drug analytically after a sufficient period of agitation in a constant temperature bath. If pH determinations are made on the mixture at the time of removal of each sample for assay, it should be possible to plot the solubility of sulfathiazole sodium as a function of the pH of the buffer solutions.

**The following references may be helpful in designing experiments similar to the one outlined here: *J. A. Ph.A., Sci Ed., 40,* 137 (1951); *42,* 157, 210, 540 (1953); *45,* 608 (1956).

Such a graph would then allow one to determine the solubility of the drug at any of a number of pH values.

The teacher now introduces the students to another important phase of the physical chemical problem: *the theoretical aspect.* Recalling the modified buffer equation which, as discussed in class, provided a means for calculating the solubility of a weak acid and its salt, the students are asked to calculate the pH required for the solubility of a 5 per cent solution of sulfathiazole sodium. The value is found to be 9.0. The students then calculate the amount of drug which will remain in solution in the pH 8.0 buffer originally contained in the prescription. The value is about 0.6 per cent w/v, a result which strongly substantiates the hypothesis that the sediment in the prescription was due to only partial solubility of the drug at this pH rather than to an incompatibility between the drug and the buffer. Calculations of solubilities at other pH values at the completion of the work allows the student to plot a theoretical curve, and to compare it with the points which were obtained experimentally. If the necessary standard solutions and apparatus are available, the experimental work can be completed in about three laboratory periods.

Further discussions on this problem can then be undertaken, and the group should be urged to consider their results in terms of predicting the action of related drug systems. The findings of the study might suggest the possibility of adjusting the pH of other salts of weak acids, such as the barbiturates, and the hydantoins. The students should now be able, with the teacher's assistance, to suggest a similar equation for calculating the solubility of salts of weak bases, such as the local anesthetics, sympathomimetic amines, and antihistamines. The group can be led to consider increasing the solubility of the separated drug in the above prescription by the use of suitable nonaqueous solvents such as glycerin, polyethylene glycols, and others. In later experiments, ways of decreasing the solubility and of dispersing and suspending the drug may be studied in a similar manner.

Although it may not be advisable to design every experiment in the physical pharmacy laboratory course in this manner, the greatest good for the upper-level student can come from the type of experiment which involves a considerable measure of problem solving and creative thought.

The example given here is an oversimplification of scientific research, and the student should be cautioned that problems are not always solved in such a neat and orderly way. Few investigations follow the logical progression of observation, hypothesis, verification by experiment, and finally the marriage of theory and experimental findings for the solution of the problem. The order is often reversed, or it is mixed in some complicated way so that it is difficult to separate and analyze the inductive and the deductive steps. But, as in all good teaching, the instructor must begin with the ideal case, rather than with the hopelessly complex one, to show the students the way. The book of scientific experimentation, like the book of life, does not come complete with answers in the back, but it is helpful to have such an appendix in the text when confronting theoretical and experimental situations for the first time.

In the dispensing course and in pharmaceutical technology the formulation of emulsified bases, the study of the masking properties of various flavoring agents, the preparation of isotonic solutions all may be analyzed in a similar manner.

Conclusion

If we consider the student as a passive subject, we will tend to mold his responses into stereotyped patterns of thought and action. If we think of him as an active responsible person, then the emphasis in the laboratory and in the classroom will be on learning, not teaching; on thinking, not memorizing, and education will become the exciting challenge that it should be.

Pharmacy teachers can be proud of the way they have presented the knowledge and skills to students through the years. When one looks at the record of accomplishments of retail, hospital, and manufacturing pharmacists, he must certainly recognize the important role that the pharmacy teacher has played in this story of success and progress. However, pharmacy, along with the other applied sciences, is growing so rapidly in an ever-tightening spiral of specialization that we must make an effort in our colleges to teach the broader underlying principles of sciences and the unification of facts, skills, and theories. The use of problem-solving techniques in the laboratory and the classroom, and the promotion of creative thinking, should be employed widely in order to prepare the future pharmacists for the rapid advancements in science and medicine. These are among the most important functions of the undergraduate course in physical pharmacy.

THE PREPARATION OF TEACHING PERSONNEL FOR THE UNDERGRADUATE COURSE IN PHYSICAL PHARMACY

MELVIN W. GREEN

For centuries the practice of medicine revolved around Hippocratic and Galenic concepts which were empirically centered. Pharmacy, in turn, was Galenical pharmacy. While minor changes, even advances, in medical-pharmaceutical practice took place, the fact remains that therapy was relatively static. Until the advent of sera and vaccines on the one hand, and arsphenamine on the other, to know pharmacy in one decade was to know pharmacy in another. Pharmaceutical elegance was the watchword and, I am afraid, little attention was paid to pharmacological elegance.

During this long dormant winter, pharmacy was largely a descriptive art and science. New developments, most of which were minor innovations rather than true developments, took place through reasoning by analogy. The little science that was involved often could not be recognized as being more than empirical pseudo-science. The pharmacist was often a true artist at this kind of cook-book formulation, and he knew that this goal had been achieved through his well-developed senses. Subtleties of taste difference were recognized by the pharmacist probably better than they were appreciated by the patient. Odor was in a similar category, and the unctious properties of an ointment were appreciated by the feel of preparation to the fingers.

But today we are living in a different medical era and, hence, a different pharmaceutical period. We have medicines which really work. These drugs are, generally speaking, quite pure; they are essentially complex chemical entities and often sensitive to chemical and physical environment. To gain their maximum usefulness these newer drugs are not just taken internally as a draught or applied in the most convenient medium at hand. But rather, the dosage form must have a certain subtlety in its make-up to bring out its full pharmacological propensities.

Oral preparations may have to bypass the stomach, or they may need buffering against the high acidity. Prompt absorption or delayed absorption may be the properties sought. Possibly the drug must have an adjuvant that will discourage kidney loss by altering resorption at kidney tubules.

Parenteral preparations must be rendered compatible with whatever tissues with which they come in contact. The purpose of such pharmaceutical preparations may be to provide almost instantaneous physiologic response, or it may be to provide delayed or gradual response.

Externally applied medicaments to the skin or mucous membranes must often have unique properties, many of which are dependent upon manipulation of the colloidal state.

Tied to all of these problems, which are only suggestive in number, is the question of stability and packaging for storage and for service in the household in a number of diverse conditions of present-day living and commercial practice.

I have recapitulated, albeit briefly, these things, because it is this environment in which pharmacy finds itself which has led to the development of so-called physical pharmacy. Already much has been said and a great deal of ink has been spilled over an attempt to define physical pharmacy. A number of conceptions of physical pharmacy are represented in this group of teachers. I will not attempt to define it in terms of a course but rather as a way of pharmaceutical life. To me physical pharmacy represents the abandonment of the descriptive approach to pharmacy in favor of a functional approach. No longer is the emphasis to be on the end-group of pharmaceutical preparations, but rather upon the functional processes that lead to the end. Further, it represents no longer an evaluation of goals by strictly subjective means, but rather the measurement of pharmaceutical success by as objective and scientific means as the science of the time will permit.

From these points of view it can be seen that the preparation of persons to teach in this area means a change in thought too. A generation ago a person could be trained to teach the Galenic approach to pharmacy with a program much less rigorous than was required to train, let us say, a pharmaceutical chemist. Such is not the case today, and one could almost go so far as to say the reverse is true.

An examination into the pharmaceutical preparations on the market today gives some clue as to the scientific training needed for their development. In the chemical area is needed a thorough background in organic characterization, some advanced synthesis, some advanced physical theory as it relates to the organic field. Physical chemistry and colloidal chemistry, including a thorough understanding of rate processes, are paramount. Analytical chemistry and its companion or branch, instrumentation, provide the keys to all sorts of studies. Certain engineering processes should be understood, also, since a laboratory process will have to go to a machine process, probably through a pilot plant stage. Physics comes into the picture in relation to such facets as compression processes and the electronics of instrumentation. Whether approached from the physics angle or that of chemistry, a knowledge of nuclear method is a useful tool in many pharmaceutical studies.

On the biological side are important studies, too. Microbiology enters into many modern pharmaceuticals. A thorough knowledge of current thought in physiology and pharmacology would not have led to some of the monstrous pharmaceuticals of the past. Dille and Hazleton, for example, have shown that

the presence of large amounts of glycerin in certain elixirs can interfere with drug absorption. While, generally, research and development laboratories are of such a size that specialists are employed in these various areas, the pharmacist must be sufficiently multi-lingual to interpret data and the idiom of the specialist to work well with him. In short, the modern research pharmacist is in a position somewhat analogous to the conductor of a symphony orchestra. He must provide the nuances to the individual specialist's work that will end up with a harmonious and useful product.

To turn out people having these prerequisites, we must depend on our graduate schools and particularly on pharmacy departments. At the start we may have to resort to the use of some nonpharmacists to provide leavening. In fact, I believe, there should be a studied plan to add some nonpharmacists to graduate research and teaching teams to add breadth and new thinking to programs. The stranger in our midst is apt to have his limitations also; if he is biologically trained he is probably modestly trained in physical chemistry and vice versa. The key to the use of such persons then becomes one of adaptability. If these scientists are adaptable they will soon find their place in the pharmaceutical patterns as has proved to be the case in several instances.

As the philosophy of physical pharmacy gathers momentum the field will grow not unlike a chain reaction. There seems to be some indication that it is growing now, for in my talk before the Section of Teachers of Graduate Instruction (*Editor's Note: see this issue "Symposium: Supply and Demand of Ph.D. Pharmacists"*) I pointed out that about twenty-nine Ph.D.'s in physical pharmacy and pharmaceutical development are expected to be available during this academic year and about forty-four the next.

An important phase of this problem, however, is the movement of many of these persons into industry. This movement is influenced by the salary picture which must be improved in all of our colleges, but I fear a factor of nearly equal importance may be lack of scientific opportunity. Fortunately this move toward industry is a reversible reaction, and every year a few industrial pharmacists return to the ivory tower. These persons ofter bring a wealth of practical know-how which can be very useful and stimulating. The important thing is to place the equilibrium point a little more in favor of the colleges while physical pharmacy is developing.

A mature profession is characterized by its ability to meet new challenges, new responsibilities, and new objectives; by its high standards of professional conduct; and by high educational standards.

Troy C. Daniels, Am. J. Pharm. Ed., 16, 546 (1953)

THE STATUS OF BIOCHEMISTRY IN SCHOOLS AND COLLEGES OF PHARMACY*

DAVID M. STUART

The number of biochemically derived medicinals introduced in the past twenty years has made it essential for the pharmacist to become aware of the chemistry, biochemistry, and pharmacology of these drugs. It thus becomes necessary for the professional teacher constantly to evaluate his courses to determine whether his courses are up to date. In order to determine how the schools and colleges of pharmacy are progressing in the teaching of biochemistry, this survey was accomplished with the following purposes in mind:

1. To determine whether courses pertaining to biochemistry in the curricula in pharmacy have kept pace with the increase in biochemical knowledge and biochemically derived products.
2. To determine the general type of biochemistry courses being taught in the various schools and colleges.
3. To note the differences, if any, between biochemistry courses in pharmacy, in biochemistry departments, in medical schools, and in other related health profession fields.
4. To attempt an evaluation of the data received and to make suggestions for improving courses in biochemistry.

The first purpose was realized by a search of the literature to determine what progress has been made in the past few years. It was found that the first survey of the teaching of biochemistry in schools and colleges of pharmacy was made by a subcommittee of the National Pharmaceutical Syllabus Committee in 1939, with Burlage as chairman (1). This committee found that out of fifty-one schools, only eighteen schools had a required course, and twenty-two offered an elective.

In 1946, Wilson (2) reported that only nineteen colleges offered a biochemistry course as such, three offered courses in blood and urine analysis, two offered courses in glandular products, and eight offered courses in biological products.

Later, in 1949, before the Teachers' Seminar on Pharmaceutical Chemistry, Deno (3) reported that forty-two institutions required courses with laboratory work, seven required courses without laboratory work, and twenty-five did not require the course.

This brief history and the data of the present survey show that much progress has been made in the number of schools and colleges teaching biochemistrry.

In the present study the data obtained are shown in the following table.

TABLE I

Number of member schools and colleges		72
Those answering the questionnaire		60
Is the biochemistry course required in your college/school?	yes	47
	no	8
	elective	5

*Presented to the Section of Teachers of Chemistry, AACP, New York City, 1957.

Qualification of the teacher ..... Ph.D. 42
M.S. 6

Background in biochemistry:
- Graduate major for graduate degree 15
- Graduate minor for graduate degree 16
- Major for graduate and undergraduate degree 2
- Minor for graduate and undergraduate degree 4
- Minor for undergraduate and major for graduate degree 1
- No major or minor degree (graduate or undergraduate) 8

Course content:
- Chemistry, absorption, digestion and excretion of carbohydrates, lipids, and proteins 47
- Enzymes 47
- Blood chemistry 47

In addition, the following topics were listed:
- Urine chemistry 46
- Vitamins 45
- Hormones 43
- Milk chemistry 6
- Detoxication 11
- Tissue chemistry 11
- Radio-isotopes 1
- Photosynthesis 3
- Foods and nutrition 9
- Carcinogenesis 2
- Photometry 2

Clock and semester hour requirements:

Didactic hours	Lab. hours (semester)	No. of schools
2	0	1
2	1	4
2	2	5
3	0	5
3	1	13
3	2	4
4	0	2
4	1	7
4	2	3
5	1	1
5	2	1
6	1	1
6	3	1
8	2	1
5	0	2[a]
5	3	1[a]

[a]Quarter system.

Are official and proprietary products discussed ..... Yes 11
No 36

Summary and Discussion

From the above data, certain points are quite clear:

1. Teachers of biochemistry have a good background, as evidenced by the large number of individuals holding the Ph.D. degree, and also by those with biochemistry as the graduate major.

2. The content of the courses offered in a majority of the schools is very similar and is generally that offered in the classical biochemical course, varying only in the amount of time spent on each topic.

3. The differences between course content in pharmacy, medical schools, etc. appear to be very slight. In pharmacy schools (a) there are fewer hours, (b) the courses are less comprehensive, (c) there is less laboratory work, and (d) there is a lack of clinical approach.

4. A very small percentage of the courses include official and proprietary products.

5. From a broad point of view, the courses in biochemistry as presently offered in the colleges and schools of pharmacy in the United States appear to be of high caliber, lacking only in one respect—the practical aspect of the course to the practicing pharmacist. This would appear to be due to the fact that a large number of individuals teaching biochemistry have not had undergraduate training in pharmacy.

Several persons have indicated that the situation with regard to proprietary and official products should be changed. It does not appear practical to teach one or two semesters of biochemistry and not include some discussion of the natural occurring official and proprietary products, as well as their derivatives, when more than 80 per cent of the graduates of our colleges and schools of pharmacy become retail pharmacists.

Medical students are taught the physiological and pharmacological actions of the biochemical products such as hormones, vitamins, etc., but lack a sound foundation in the chemistry of these compounds and the relationship between structure and pharmacological activity. In most cases they do not understand breakdown products and how activity is prolonged by the different derivatives. If the pharmacist is to attain his place in the medical world as a "pharmaceutical consultant," he must be able to discuss with some degree of intelligence such aspects of the biochemical products which he dispenses.

A subcommittee on biochemistry of the National Pharmaceutical Syllabus Committee (1) suggested that trained and qualified individuals should be teaching biochemistry. This goal appears to have been achieved, but on the other hand, it appears that there are now too many teachers of biochemistry with no pharmaceutical background with a resultant lack of pharmaceutical applications on biochemical aspects.

The excuse usually given for omitting official and proprietary products is, "There is not sufficient time for inclusion of these subjects." However, from a check of the course contents returned with the questionnaire, it is clear that many schools do find time to discuss many aspects not pertinent to the retail pharmacist. Among these subjects are generous portions of clinical chemistry, such as blood and urine analysis. To borrow from Dr. Howard B. Lewis (4) in 1946:

> A word of caution may serve to emphasize the conviction the writer has held for many years. The catalogues of some schools have shown there has been offered a "practical" (laboratory) course in urine analysis, accompanied in many cases by some training in hematology and clinical blood analysis. This work is

> frequently misnamed "biochemistry" and is offered essentially as a "bread and butter" course, justified by an alleged opportunity for pharmacists to offer to physicians the services of a clinical laboratory. This may have been true twenty-five years ago, but conditions have changed materially and such opportunities are greatly restricted and further restriction may be expected to be imposed in the future. Currently such work in hospitals or accredited laboratories must be done under the supervision of a physician and is performed by a "medical technologist," whose training is closely supervised and is highly specialized. The pharmacy student without more training than is afforded by such superficial courses as those mentioned can hardly qualify.

Also, Dr. Lewis states:

> If the practitioners of pharmacy are to cooperate intelligently with the physician of tomorrow, they must possess an adequate knowledge of the normal chemistry and functions of the human body, a knowledge which is best obtained from a combination of chemistry and physiology (4).

In our new role as pharmaceutical consultants, I might add to the foregoing statement that we need to add official and nonofficial products to biochemistry courses.

For example, when the chemistry of carbohydrates is discussed, such products as glucurono-lactone, lactose, liquid glucose, etc. might be included. In the discussion of amino acids, the use of lysine and other protein hydrolysates can be mentioned. During the discussion of fat absorption and storage, the cholinolytic or lipotropic agents can be discussed. The differences in physical and chemical properties of the different insulin products should be included.

During the discussion of hormones, the various derivatives and synthetics should be covered as well as the chemical behavior, etc. Finally, during the discussion on blood chemistry, the various coagulants, anticoagulants, hematopoietics, plasma volume expanders, etc., should be covered.

With the few examples mentioned, I believe it is clear that it might be appropriate for schools and colleges of pharmacy to re-examine their present biochemistry courses with the aim of seeing that such products as previously mentioned relating to the biochemical system are adequately treated.

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The essential preliminary step to professional growth and delevopment is the adoption of educational standards designed to achieve the aims and objectives of the profession, and to prepare the future pharmacists for the pharmacy of the future.

Troy C. Daniels, Am. J. Pharm. Ed., 16, 546 (1953)

A STIMULANT FOR INORGANIC PHARMACEUTICAL CHEMISTRY*

ALLEN I. WHITE

It is interesting to note that during the past decade there has been very little written about the course in inorganic pharmaceutical chemistry. Similarly, it has not been a topic frequently discussed at national and regional meetings. At a time during which so much attention has been given to the pharmacy curriculum and its various parts, one might say that the course has become conspicuous because of lack of interest in it. During the same period of time, pharmaceutical chemists have devoted considerable attention to the course dealing with organic medicinal products. A striking example of the situation is provided by the program presented at the Teachers' Seminar on Pharmaceutical Chemistry in 1952 (1). At this conference no less than nine papers were devoted to the organization and content of the course in organic pharmaceutical chemistry while only one paper dealt with inorganic pharmaceutical chemistry. Since then, a number of other papers have appeared dealing with the teaching of organic pharmaceutical chemistry, but I have found none dealing with inorganic pharmaceutical chemistry.

There is no question in my mind that there are some very good reasons for this situation. There can be no doubt of the relative importance of organic medicinal products in modern therapy. The large number of new synthetic organic medicinals constantly being developed and marketed commands our attention. In addition, most of us, by training and interest, are more likely to direct our attention to organic products rather than to inorganic ones. Our research programs are more likely to be concerned with organic synthetic or natural products than with inorganic compounds. But these conditions do not necessarily mean that a course concerned with inorganic medicinal products is without any significance or importance.

What significance do the schools of pharmacy attach to a course in inorganic pharmaceutical chemistry? As you may be aware, a number of schools do not now offer a separate course covering material in this area. Carrying out a survey to analyze carefully the situation did not seem warranted, but a perusal of conveniently available catalogs or bulletins of fifty-seven member colleges of the AACP led to the conclusion that about one-fourth of our member colleges do not offer separate instruction in the subject matter of inorganic pharmaceutical chemistry. Among those that do, some offer it as a pharmaceutical chemistry course; some offer it as a pharmacy course. It is interesting to note that a few schools combine the study of inorganic and organic compounds in one course.

At this time when so many faculties are discussing and planning the development of the professional courses to be included in a five year curriculum, it seems particularly pertinent to take a serious look at inorganic pharmaceutical chemistry. After careful study, some may decide that what this course needs is an overdose of an anesthetic rather than a stimulant. It is my conviction that this would not be generally true. In the 1952 report prepared by Blauch

*Presented to the Section of Teachers of Chemistry, AACP, New York City, 1957.

and Webster (2), inorganic pharmaceutical chemistry is a suggested course. In the 1956 report of the AACP Committee on Curriculum (3), inorganic pharmaceutical chemistry is recommended as a required course in the professional curriculum. These reports indicate that there are a substantial number of pharmaceutical educators who are convinced that there is a sufficient body of vital information to justify a separate course in inorganic pharmaceutical chemistry.

It is not the intent of this presentation to suggest what the content of such a course might be by way of a syllabus or to discuss the order of presentation of the material. These topics were well developed by Orr at the 1952 Teachers' Seminar on Pharmaceutical Chemistry, and his remarks have been published in the Proceedings of that seminar (4). Blauch and Webster (2) present a concise description of the objectives of a course in inorganic pharmaceutical chemistry. I wish to call to your attention some arguments for justifying inorganic pharmaceutical chemistry as an independent course in the pharmaceutical curriculum and some ideas for instilling greater interest on the part of both teachers and students in course content.

It is not an uncommon experience to find inorganic pharmaceutical chemistry a subject for scrutiny when the topic of removing the deadwood from the curriculum is brought up. Undoubtedly, like any other course that has not been subjected to constant revision, an inorganic pharmaceutical chemistry course may contain much obsolete and unimportant material. The instructor who today devotes more than a few passing remarks to hypophosphites and lithium compounds, for example, will be incapable of defending to his colleagues and his students the current importance of inorganic subject matter. On the other hand, an alert instructor will be hard pressed to find sufficient time in that ordinarily allotted to this course if he is to present adequately the interesting new developments as well as the still-important traditional material.

Contrary to a rather widespread belief held by many pharmacists, inorganic pharmaceuticals have been enjoying a resurgence in importance medicinally. As is true in other areas of pharmacy, the pharmacist's contact with inorganics is different than it was a few decades ago. However, the fact that he does not have several stock bottles of radioactive isotopes sitting on his prescription room shelves does not mean that he may be excused from being informed about radioactive elements and their use in therapy, diagnosis, and research. Similarly, the recent development of knowledge concerning the role of traces of a number of metal ions in biological processes has made a knowledge of certain elements and their compounds essential today when only a few years ago either no reference was made to them, or they were lightly skimmed over. The utilization of inorganic compounds for the adjustment of pH, isotonicity, and for the preservation of solutions to be injected or applied on mucous membrane surfaces is of increasing importance. Fluoride compounds have been creating great interest as means of preventing dental caries. Selenium and zirconium compounds are now being employed therapeutically. These examples illustrate the point that a study of inorganic compounds is not concerned only with obsolete and seldom-used products. There is vitality in the field to stimulate both teacher and student.

Also a point of material consequence to the teaching of inorganic pharmaceutical chemistry is the place it occupies in the extended curriculum. Those of you who have had experience with a five year curriculum can testify

as to the profound effect new course sequences have on course content and presentation. During the years that I have been teaching inorganic pharmaceutical chemistry, its place in our curriculum has changed in several steps from the second semester of the freshman year of a four year curriculum to the first semester of the fourth year in a five year curriculum. It follows, of course, that such a change challenges the instructor in several ways to develop a considerably different course than what was once offered. The greatly improved chemical, biological, and professional background of students who have completed not only inorganic and qualitative chemistry, but also quantitative analysis, organic chemistry, physics, zoology, physiology, and microbiology in addition to beginning pharmacy and pharmacognosy makes it mandatory to organize and present the material at an advanced level. The kind of material that can be included in a course at this level may provide a real stimulant to the development of an excellent and important inorganic pharmaceutical chemistry course. Certainly, a new position in the curriculum will require that the course have a "new look."

This "new look" might well include subject matter that may be described as a review and application of important general chemical concepts. The course in inorganic pharmaceutical chemistry is well suited for reviewing and elaborating on such subjects as general atomic structure, the nature of chemical bonds, coordination compounds, general properties of molecules, and solubility and dissociation phenomena. Unless the student has been exposed to a course in physical chemistry, his knowledge of these topics is likely to be superficial. Certainly, he will not have learned to apply them to the evaluation and handling of therapeutic agents. The development of his understanding of such concepts will be of value in other courses and in his professional activity. In addition, he will be better prepared to inform and counsel the general public on many matters of a general chemical nature. The importance of the pharmacist having ability to perform in such a capacity is well known to you. The exciting developments taking place that involve inorganic chemistry make it desirable that the pharmacist have a broader and deeper understanding rather than a diminishing knowledge of this subject. I would like to illustrate this briefly with just one example. Its application is colloquial, since the interest of metropolitan people in fertilizers is probably very slight. But in our locality, much use is being made of ammonia to increase the nitrogen content of the soil. Of course, pharmacists are not directly concerned with its distribution or use. Yet, people in the community are likely to look upon the pharmacist as capable of understanding and explaining its use as a fertilizer. In addition, he may be, indeed he should be, looked upon as a professional person capable of supplying information on problems relating to the handling, storage, and toxicity of ammonia. Many other examples might be used to illustrate ways by which a pharmacist can serve the general public when he possesses such knowledge as may be acquired from a study of inorganic compounds. Is this not the kind of contribution the truly professional person should be capable of making?

To carefully collect, collate, and integrate up-to-date information for our students can be a challenging opportunity. In doing so, it is important to avoid the splintering of knowledge to the point that overemphasis is achieved in a small field to the disadvantage of the whole. Too often pharmacy curricula have been encumbered with splinter courses simply because of a deep interest in a certain topic on the part of a faculty member. Recently, such a splintering

has been advocated in connection with radioisotopes. Such a practice is not educationally sound. It seems just as logical to establish a special course for the consideration of tranquilizers apart from the regular courses of organic pharmaceutical chemistry and pharmacology as to have a special course for radioactive materials apart from inorganic pharmaceutical chemistry. Removing such material not only leads to a diminishing of interest in the course, but also, it deprives the student of the educational advantage of studying the topic in context with related information.

As teachers, we should be continuously aware of the effect our attitudes have on our students. If an apathy toward inorganic pharmaceutical chemistry exists in the professor, you may be sure to find disinterest, if not antagonism, in his students. But certainly a course should not be discarded because it is poorly taught. Rather, it is time to apply a stimulant to achieve effective teaching. I find that there is a great deal of stimulating material that is appropriate for the course in inorganic pharmaceutical chemistry.

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Pharmacy's organizations are inter-dependent, and our greatest need is for unity and understanding. There can be no place for partisan and professional politics.

Troy C. Daniels, Am. J. Pharm. Ed., 16, 547 (1953)

ACHIEVEMENT IN GENERAL COLLEGE CHEMISTRY VERSUS SCORES FROM VARIOUS ENTRANCE TESTS*

ALFRED J. PERKINS

Since 1945 a program of selection of students based on the results of a series of aptitude tests and other measures has been in operation at the College of Pharmacy of the University of Illinois. The principal tests used are the American Council on Education Psychological Examination and part of the Iowa Mathematics Test. In addition, the high school grade point average plays a prominent role in the selection formula. However, even when there is a large number of applicants from which to choose, a considerable number of those chosen have trouble with general chemistry and fail. In order to gain better insight into the preparation and abilities of the freshmen, the American Council on Education Chemistry Placement Examination Form K was given at the first class meeting to the classes entering in 1952, '53, and '54. The distribution of students within the three classes is shown in Table I. It was felt that the resulting information might prove useful in modifying the selection test battery or for the purpose of sectioning the incoming students.

TABLE I

DISTRIBUTION OF STUDENTS TESTED

Year	No. Taking Chemistry	Total Freshmen	No. of Applicants
1952	79	125	235
1953	96	125	196
1954	138	175	185

As soon as the data were put in a form such that it could be scanned as a whole, it became apparent that the student who had not had high school chemistry was at a great disadvantage. While it had been appreciated that the "no high school chemistry" student would probably find the first month more difficult than would the student already somewhat acquainted with the vocabulary, the concepts and the methods of computation, the size of the difference in failure rates came as a distinct surprise. The corresponding data for the classes entering in 1955 and '56 were assembled. The results of this survey for a total of five classes are shown in Table II.

TABLE II

GENERAL CHEMISTRY GRADES VERSUS HIGH SCHOOL CHEMISTRY

General Chemistry Grade Point Average	Without High School Chemistry		With High School Chemistry	
	Number	*Per cent*	*Number*	*Per cent*
0.0 - 0.5	36	63.2	112	20.8
1.0 - 1.5	6	10.5	80	14.9
2.0 - 2.5	15	26.3	265	49.3
3.0 - 4.0	0	0.0	81	15.0
	57		538	

*Presented to the Section of Teachers of Chemistry, AACP, New York City, 1957.

During the past five years, 63.2 per cent of those who had not had high school chemistry failed compared with the 20.8 per cent failure rate of those students who had had some previous work in chemistry. Unfortunately, the number entering who have not had high school chemistry is increasing. Until the last two classes, the number of students without chemistry preparation was small, never more than eleven, usually about six, corresponding to about 8 per cent of the total class. A special section or course for them was not thought necessary or advisable. However, the last two entering classes have not only been larger due to increased facilities, but the proportion of those with no previous training in chemistry has jumped to about 12 per cent, thus raising the actual number to seventeen or about the number in a recitation section. For next year it is planned to put this group in a separate section which will meet an extra period so they can be given extra help.

Returning to the main subject of discussion, correlation coefficients were determined relating chemistry grade point averages and raw scores on the ACE Psychological Examination, the Iowa Mathematics Test, the ACE Chemistry Placement Examination, and high school grade point averages. Also the intercorrelation coefficients of these measures were calculated. The college grade point averages for the two quarters were calculated on the basis of A = 4.0; B = 3.0; C = 2.0; D = 1.0; and E = 0.0. Only the data for the 290 students who had had high school chemistry were used for this work.

As would be expected, the Chemistry Placement Examination showed the highest correlation having a coefficient of 0.518. The meaning of this coefficient may be shown best by an illustration. If an applicant who had not taken the Chemistry Placement Examination came in for advice and asked "What are my chances of getting a C average in general chemistry," the answer would have to be based on the average of all past students' grades and the variation in those grades. In terms of our 290 students, the answer would be that the chances are two to three that his grade point average would lie between a 1.0 and 3.0 or D and B.

On the other hand, when the applicant has taken a diagnostic test which shows a significant correlation with general chemistry grades, a better prediction can be made. Obviously, each applicant will now get an answer based on his own raw score. Secondly, the range of grades in the answer would be smaller. Suppose that our applicant's raw score is twenty, about the average. Then his predicted grade point average would be 2.0, with the statement that the chances are two to three that it would fall between 1.5 and 2.5. Note that the range of grade point averages quoted has been narrowed. The correlation coefficient measures this relative narrowing of the range.

Since each measurement of aptitude, achievement, or behavior adds something to the total evaluation of an individual, a multiple correlation computation was made and an equation predicting a college chemistry grade point average obtained. This equation is

$$Y = 0.028X_1 + 0.461X_2 + 0.13X_4 + 0.005X_3 - 1.73,$$

where Y is the predicted general chemistry grade point average, X_1 is the chemistry placement raw score, X_2 is the high school grade point average, X_3 is the ACE Psychological Exam raw score, and X_4 is the Iowa Mathe-

matics Test raw score. In statistical terms, the multiple correlation coefficient is 0.643. The ability of this formula to predict is shown in Figure 1.

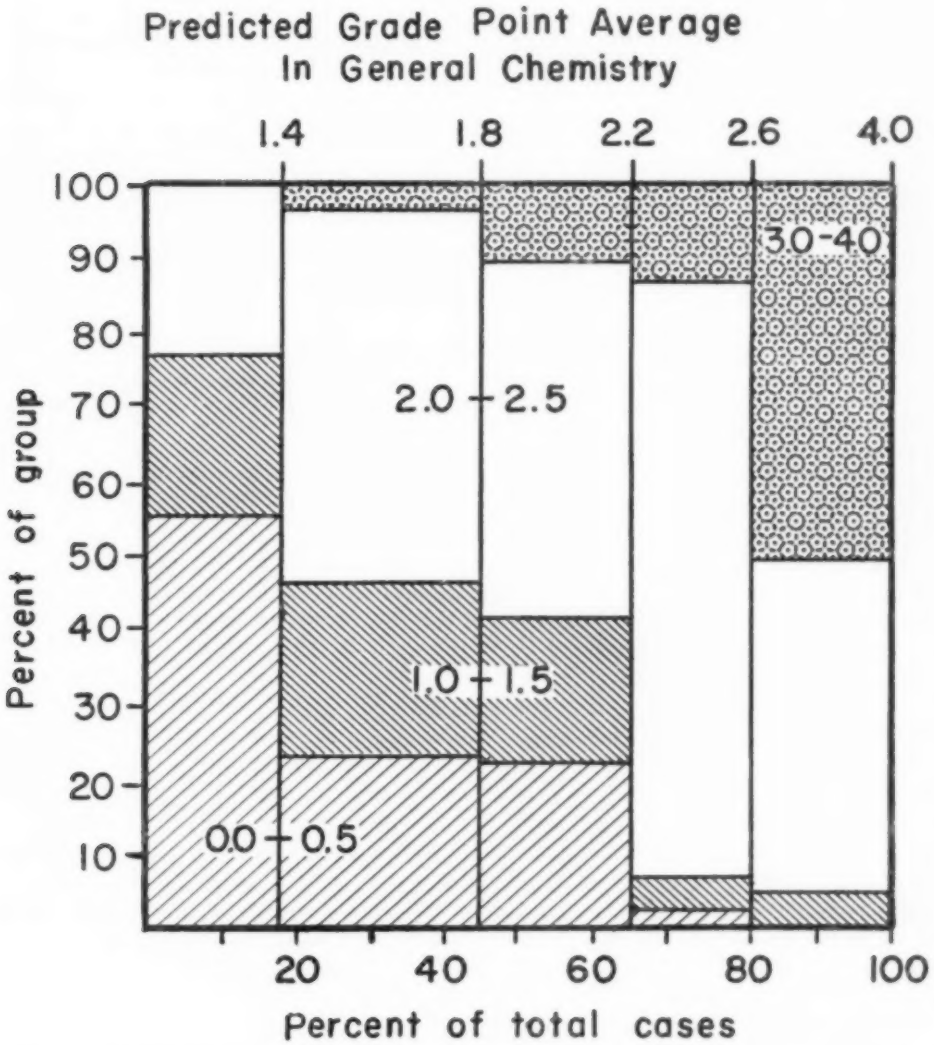

FIG. 1. PREDICTION OF GENERAL CHEMISTRY GRADES BY FORMULA

The square represents the 290 students. The abscissa at the top is the predicted college chemistry grade point average. The group was divided into five rather arbitrary subgroups, the relative size of each subgroup I have indicated by the width of the column. The fraction of the entire group within each subgroup is given by the lower abscissa. The ordinate gives the per cent of the subgroup who actually achieve a given grade point average. Thus 17.6 per cent of the group make up the first subgroup which

includes those who would be expected to fail or at best get some D's. Of this subgroup, 55 per cent actually failed, and another 22 per cent received at least one grade below C. In other words, if the predictors indicate a grade point average of less than 1.4, the chances are three to one that the student will not achieve a C average. In the next subgroup, 26.5 per cent of the total, 23 per cent fail, another 23 per cent do poorly, and 54 per cent achieve an average of C or better. Thus the chances of getting a C average are about even for a student in this subgroup. The third subgroup whose predicted grade point average lies in the range 1.8 to 2.2 contains 20.3 per cent of the total group. Here 22 per cent failed, 19 per cent did poorly, and 59 per cent got C's or better. The chances of getting a C average are thus about three to two for an individual in this subgroup. For the fourth subgroup or 16.6 per cent of the total, 94 per cent achieve a C or better average, and of the last subgroup 96 per cent get a C or better. In this case where we would expect to find our A and B students, 51 per cent of the subgroup had a B or better average.

In 1956 Professor Mancott reported to the Section of Teachers of Chemistry a similar correlation using a test prepared at the Brooklyn College of Pharmacy. Our correlation coefficients are somewhat higher than his. T. S. Burkhalter of Texas A. & M. reported (1) a study using six different achievement tests and the high school grade point average. The tests included the American Council on Education Psychological Examination, two mathematics tests—one involving numerical problems, the other algebra—, the Chemistry Placement Examination, and two English tests—one on grammar, the other on reading rate, vocabulary, and comprehension. In preparing this correlation 16 per cent of the students, those who did not complete the semester's work, were omitted from the calculation. For those who completed the semester only the algebra test, the chemistry test, and the high school grade point average showed any significant correlation. However, Burkhalter states that "practically every student who made a low grade on either the numerical test or the reading comprehension test dropped the course." The main difference in our figures and Burkhalter's lies in the significance of the psychological examination.

Dr. Paul Horst of the University of Washington reported (2) his studies on the prediction of achievement in thirty-two course areas based on seven tests and six high school course area averages. His predictions in the field of chemistry are somewhat more accurate than ours as measured by the fraction who achieve a predicted grade average. However, his methods would be time consuming even for one course area without an electronic calculator to do the work, due to the large number of items used.

A correlation of this sort is of no value unless put to some use. The Chemistry Placement Examination could be used as one of the entrance tests. It would seem reasonable to do this since chemistry courses make up such a large part of the pharmacy curriculum. If this were done, a number of the applicants not having high school chemistry might not be accepted. However, when predictions were made for the no chemistry group and compared with their actual grades, it was found that only one of the eight who got a C or better might possibly have been denied entrance. Furthermore, eight of the fourteen who failed probably would have been eliminated.

Another important use of these predictions is in counseling and sectioning. At the University of Illinois we have the problem that a large portion of the students work excessively after school. On the basis of predicted grades, the chances of a student obtaining a satisfactory grade could be shown to him at the beginning of the school year and a sensible program of study worked out. Further, if a student did not live up to expectations, his counselor would have additional evidence to use in recommending changes in study habits.

During the past year in an effort to cut down failures, the general chemistry class was resectioned at the end of the first four weeks of the quarter. The resectioning was based on the average grades on weekly quizzes, the lowest students being brought together into two sections. An extra recitation per week was required of these sections. A number of students, who otherwise would probably have failed, received passing grades and went on through the second quarter successfully. This program had the added advantage that more attention in recitation could be given to the better students. Earlier sectioning based on predictions of this type would be of advantage. In four or five weeks a student can get so far behind that he cannot catch up, especially under the quarter system. Therefore, we plan to use this prediction formula to section students in general chemistry this fall.

There is room for improvements in the predictions. Based on Burkhalter's results and earlier work at our own college, the inclusion of a reading comprehension test and an algebra test would undoubtedly add to their accuracy.

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If we are going to measure the position of pharmacy and pharmaceutical education in the public mind we must at least entertain the idea that it rates very high. It must rate high in the mind of the teacher, in the minds of our students. If they are not motivated at the time of admission by an inherent desire to progress in the educational pattern, then they must be motivated while in school. This motivation can be successfully carried out only by the teacher in pharmacy and by the product of our schools, the pharmacist.

Edward C. Reif, Am. J. Pharm. Ed., 17, 529 (1953)

SYMPOSIUM: PHARMACY ADMINISTRATION--ITS PLACE IN THE FIVE YEAR PROGRAM*

PART I: JOSEPH H. KERN

The dual role of professionalism and commercialism that the future pharmacists will play in the economy and health of our nation is a clear mandate to pharmaceutical education. In fulfilling and discharging their responsibilities as members of the health team, the future pharmacists must be thoroughly trained in the theory and application of the principles of their profession and in the operation of a retail pharmacy.

Teachers of pharmacy administration will have to assume their part of the responsibility for how well pharmaceutical education equips the future pharmacist for this dual role. The primary responsibility of an educator is the development of a program. Our profession is in a constant state of fluxion, and the day that it becomes otherwise it will no longer be a profession. Program development must be based on the needs of the profession as they are today and projected for the future. Present-day needs more or less demand that we as educators improve the educational program. Recognizing the needs and in an attempt to fulfill our responsibilities we have agreed to expand our educational program to five years beginning in 1960. Our reasoning is basically founded on two principles: 1) the future pharmacist must be a more educated individual; therefore, more general educational requirements are in order, and, 2) the future pharmacist must have a better and broader foundation in the professional area; this requires more time and the increasing of the requirements for pharmacy administration. It is conceivable that the lack of training in the pharmacy administration area in the past has had much to do with the plight of retail pharmacy today.

It is not the intent of this paper to recommend standards for pharmacy administration; however, it is doubtful that much will be gained in the new five year program if there are less than fifteen semester hours of courses in the pharmacy administration area. In this era of specialization it might be well to point out that the five year program will allow for a more flexible program that will fit every need. Each institution will level a certain amount of restrictions. It is the responsibility of the teacher of pharmacy administration to work out a compromise within the limits of the restrictions that best fits his needs.

Regardless of the type of program selected—a straight five year program, a one year pre-pharmacy and four year professional, or a two years pre-pharmacy and three years professional—the professional program should be based on a number of courses that form the core, supplemented with electives. This should be recognized by each department within the schools and colleges of pharmacy.

The area of pharmacy administration has been defined as that area that encompasses economics, marketing, management, accounting, and law. In many institutions the accounting and economics will undoubtedly be a part of the pre-pharmacy program while in others the entire area may have to be covered in the professional program. At the University of Florida our

*Presented to the Section of Teachers of Pharmacy Administration, AACP, New York City, 1957.

present thinking with respect to the five year program is for a two year pre-pharmacy program and three years of a professional program. A situation exists that prevents us from offering economics and accounting in the pre-pharmacy program, and we are presently planning on covering all facets of the pharmacy administration area in the professional program.

Our core program or the courses required of all graduates for a Bachelor of Science in Pharmacy includes pharmaceutical marketing, two semester hours, offered the second semester of the first professional year. Pharmacy accounting, two semester hours, and pharmaceutical jurisprudence, three semester hours, are required the first semester of the second professional year. Retail pharmacy management, two semester hours, and another three semester hours of pharmaceutical jurisprudence are offered the second semester of the second professional year. This makes a total of twelve semester hours in pharmacy administration required in the professional program. The flexibility of the over-all program allows the student to select a major in retail pharmacy, hospital pharmacy, or research pharmacy at the end of the first professional year. The major selected determines approximately 50 per cent of the elective courses that the student will take. For example, a student selecting retail pharmacy as a major will be required to take in addition to the twelve hours mentioned above, six additional semester hours in retail pharmacy management. This makes a total of eighteen semester hours in pharmacy administration for the retail pharmacy major. It has been found and statistics show that 85-90 per cent of our present-day graduates go into the retail phase of our profession, and the demand from this area has never been greater. Beyond this the student may select up to a total of seven semester hours of courses in hospital and sick room accessories, detailing, drug wholesaling, minor problems in pharmacy administration, and seminar in pharmacy administration. These are a few of the professional electives, and the student may select from any area in the university. Two, three-semester-hour courses in pharmaceutical specialties are also required electives for the major in retail pharmacy. Essentially this gives a total of nineteen hours of electives.

The students selecting hospital pharmacy as a major will be required to take three semester hours of hospital administration which will be the responsibility of the teacher of pharmacy administration. The courses listed as electives may be elected by any pharmacy student regardless of the student's selected major.

A great deal could be said regarding each course and its contribution to the over-all program; however, it is not the author's intent at this time to go into a description of courses. It is possible that only the well-trained teacher of pharmacy administration will be abie to devise the type of program that will answer the needs of pharmacy in the year 2000.

Pharmacy administration must accept the challenge and, recognizing its responsibility, prove to the deans and faculties that it is an essential part of pharmaceutical education. In order for the faculties to work together and put together an educational program that will fulfill the needs and demands of our profession, all must know what the others need and want. Our deans and faculties will never know and understand the needs of pharmacy administration until the teachers of pharmacy administration know and understand the needs of our profession in light of pharmacy administration.

PART II: JOSEPH D. McEVILLA

I am grateful for the opportunity of expressing my views on the place of pharmacy administration in the five year curriculum.

In examining the various editions of the *Pharmaceutical Syllabus* from the first edition in 1910 through its fifth revision in 1945, one finds that the place of pharmacy administration in the pharmacy curriculum has increased from the fifty-five clock hours allotted it in the first edition to 144 clock hours specified in its fifth revision. The Pharmaceutical Survey recommended an increase in the allotted time devoted to the area of pharmacy administration to fifteen credit hours or 240 clock hours of instruction. The suggested minimum credit distribution consisted of economics, three credit hours; marketing, three credit hours; accounting, three credit hours; management, three credit hours. I should like to emphasize that these suggestions were minimum and should be considered as such. This would indicate that pharmacy administration has a recognized place in the pharmacy curriculum, if we define place as that part occupied by or belonging to a thing under consideration. At this time, however, I would like to define place as the relationships of a course of study to other courses in a series or group of studies.

The modern pharmacist, regardless of his area of practice, must be educated as a pharmacist, a business person, and as a member of society. Since the greater portion of the graduates of the schools and colleges of pharmacy engage in the retail practice of pharmacy, this should receive the major emphasis in the applied courses in the area of pharmacy administration. We must not, however, feel that we have nothing to offer the student who desires to devote his efforts to hospital practice or to medical detailing or for that matter pharmaceutical research—nothing could be further from the truth. Pharmacy administration has something to contribute to success in each of these areas. I should like to confine my remarks to the preparation of those students who will practice pharmacy in retail organizations.

The economics of pharmacy have been recognized since the days of Proctor. The social aspects of pharmacy are only recently receiving the attention they deserve. It is to face and solve the economic and social problems of pharmaceutical practice that we must prepare the student.

In order that he may be able to face and solve these problems, it is desirable that he be educated in the areas of sociology, anthropology, psychology, and economics. To suggest that the pharmacist be schooled in these areas at first seems just short of revolutionary, however, the addition of the fifth year to pharmaceutical education was made with the understanding that the additional year would be for the purpose of giving the pharmacy student a more liberal education. What better way to acquire a more liberal education than from the pursuit of the aforementioned courses?

If the inclusion of all of the proposed courses in the social sciences is not possible and I were forced to make a choice of only one, I would desire that the pharmacy student be well grounded in economics. For it is upon the science of economics that pharmacy administration is built. It is here that the student learns the principles upon which are based the areas of accounting, marketing, retail operation, and management.

Pharmacy administration then takes its place as a part of the educational process designed to prepare the student to engage in the complicated aspects

of earning a living, to engage in the successful practice of pharmacy, both professionally and economically.

The role of pharmacy administration is to prepare the student to take his position among the members of the pharmaceutical profession; to take his place in this dual role of professional man and business man. For it is now recognized that the practice of pharmacy is a two-sided coin—one side professional, a member of the health sciences, a vital partner in the health team; the other side, a highly competitive business playing its part in the community of private enterprise, an important part in the economic system of American capitalism. It is the place of pharmacy administration to show the student the processes by which the professional and the business part of pharmaceutical practice are made to work, contributing to and improving the health of the American community. Pharmacy administration has an interest in the sciences of physiology, pharmacology, pharmacognosy, pharmaceutical chemistry, and pharmacy. It must show how each of these sciences contributes to the over-all practice of pharmacy in conjunction with the social sciences. For it is the joining of these two areas of science, the pharmaceutical and the social, that creates the present-day practice of pharmacy.

Pharmacy administration is the area of pharmaceutical education upon which should fall the responsibility of leading the student across the bridge which connects the natural and physical sciences with the social sciences. It is our obligation to the student and to the pharmaceutical profession, of which we are all a part, to impart the principles which will enable the future pharmacist to conduct his business operation in the highest concepts of business and professional ethics.

Pharmacy administration has yet another role in the education of the future pharmacist. It must open up the entire picture of American pharmacy. The pharmaceutical manufacturer and wholesaler play a most important part in the all-inclusive picture of "pharmacy." The student must be familiar with the part these two segments of pharmacy play in the development and distributive processes. The relationship between the three segments of American pharmacy—manufacturer, wholesaler, and retail practitioner—should be one of admiration and trust. This should be a tri-union of strength for one can not exist without the other—the existence of each is dependent upon the existence of the other two.

Having attempted to show the place of pharmacy administration from the standpoint of desirable minimum credit hours of study as outlined in The Pharmaceutical Survey and from the standpoint of its position in relationship to other courses contained in the social sciences, and to a very limited extent in relationship with other courses in the pharmaceutical curriculum, it is desirable to discuss what all this should accomplish.

Having received a minimum of education in the various areas of the social sciences followed by the more applied areas of marketing, accounting, retail pharmacy operation, medical detailing, hospital pharmacy administration, and the economics of the pharmaceutical industry, the future members of the profession of pharmacy should have the background necessary to formulate answers to some of the social and economic problems which will confront pharmacy in the next few decades. He will be able to call upon the experiences of ages past, to examine the problems from the standpoint

of their effect upon society, in addition to their immediate and ultimate effect upon the health sciences in general, and upon the practice of pharmacy in particular. Study in the area of pharmacy administration should enable the pharmacist to have a more comprehensive understanding of the economic aspects of modern pharmaceutical practice. It should provide him with a practical approach to modern methods of distribution and retailing. For those who desire to enter the manufacturing or wholesaling areas of pharmacy, it should provide an insight into the administrative operations of these areas. For those who desire to follow their profession in the area of medical detailing, it should provide an excellent background as well as fundamental training in modern selling techniques.

By having a background in the social sciences and in pharmacy administration, the student will be able to see more clearly his place in the community, in the health sciences, in the business world, and in his own profession of pharmacy. He will have an awareness of the part he is to play in the advancement of his profession. This then becomes the place of pharmacy administration in the five year curriculum. This is the place of pharmacy administration in the education of the future pharmacist.

Pharmacists . . . have personality, good manners, and other human qualifications which are not studied in text books or listed in examinations. These are intangible things than can grow up in almost any course, however factual or specialized, in the classroom of fine teachers and in the everyday friendliness of campus life.

Edward C. Reif, Am. J. Pharm. Ed., 17, 537 (1953)

BUSINESS COURSES IN THE PHARMACY CURRICULUM*

JOHN F. McCLOSKEY

It is a pleasure to have this opportunity to express myself on the subject of education in pharmacy and specifically on the newest of areas in the pharmacy curriculum—pharmacy administration.

First, I should like to make a few remarks about the various curriculums I have read for graduate programs in pharmacy administration. It will bring no prestige to the colleges of pharmacy if we set up graduate programs in which the course material is largely that required in the lower-division classes in a college of business administration. Such courses as essentials of this or that are not graduate level. Neither are courses in fundamentals of this or that. If graduate degrees are going to be conferred in the area of pharmacy administration, the courses required should be on a much higher level and have prerequisite courses in the various areas.

Years ago pharmaceutical education was severely criticized from many sources. The criticisms were against the type of degree given, the granting of degrees for fewer years of study than for other collegiate degrees, the special or incomplete courses given under the titles of established academic courses, the educational qualifications of the teachers, the quality and quantity of courses, the quality of the students accepted for pharmacy, the lack of ethics or observance of common rules of business, and, finally, the unfavorable representation created by many of the graduates in pharmacy. Pharmaceutical education was often referred to as "trade school" training. Participation in university programs and extracurricular affairs were seldom part of pharmacy students' activities. Pharmacy was an isolated unit on the campus of most universities, and the student seldom if ever had to compete on a scholastic basis with the students of other colleges and departments of the university. These were not all of the indictments against pharmacy, but they were sufficient in the minds of many people to justify their criticisms.

Realizing that pharmaceutical education must be improved, high school graduation became a requirement, the two year course gave way to the three year course, and after a short period of miscalculation the course was extended to four years in line with other degree programs. The courses began to be standardized on a collegiate level in a fairly respectable curriculum. Nevertheless, the quality of the courses, the quality of instruction, and the quality of students were in need of improvement. Advances began to be made, criticisms lessened, and a measure of respect began to flow to the colleges of pharmacy. Much remained to be done to make facilities, equipment, methods of examining and grading, and use of the library reach a parity with other colleges and departments. The progress was slow, but it was in the right direction.

Some educators in pharmacy were aware of the criticisms and were cognizant of the shortcomings in pharmaceutical education. To obtain factual information about education in pharmacy, studies began to be made.

*Presented to the Section of Teachers of Pharmacy Administration, AACP, New York City, 1957.

Probably the first of these studies concerning pharmaceutical education was made by Henry L. Taylor. It covered the years 1898-1899. It was part of a study about professional education in the United States and was published in 1900. In 1910 the first issue of the *Pharmaceutical Syllabus* was published, and the last issue, No. 5, was mimeographed in 1942. The *Syllabus* presented the accumulated thinking of educators over a period of many years for the construction of a good pharmaceutical curriculum. The most comprehensive study concerning pharmaceutical education was published in 1927 under the title of *Basic Material for a Pharmaceutical Curriculum*. The study was made by W. W. Charters, A. B. Lemon, and Leon Monell. The report was most opportune because the three year course in pharmacy that began in 1925 was to be replaced by the four year course in 1932. Material from the "Charter's Survey" was used to revise courses in the colleges. The *Fourth Pharmaceutical Syllabus* of 1932 made extensive use of the *Survey*, and the state boards of pharmacy found it most useful in improving their examinations. These studies were followed in 1937 by one by James M. Dille on *Teaching Pharmacology in Pharmacy Colleges*, and in 1938 R. A. Deno made a study on "Basic Biological Sciences in Colleges of Pharmacy." In the various *Proceedings of the American Conference of Pharmaceutical Faculties*, the agitation for studies on pharmaceutical education is reported. No doubt this agitation for surveys and studies was stimulated by the publication of two books around 1910 by Abraham Flexner. Flexner's books, *Medical Education in the United States* and *I Remember*, are classics in the study of professional education. The last and most important major study concerning pharmaceutical education was The Pharmaceutical Survey under the auspices of the American Council on Education, supported by the American Foundation for Pharmaceutical Education, published in 1950. The effects of this survey have been phenomenal. Pharmaceutical education has been subjected to closer scrutiny than ever before and was found in need of organization, planning, and specific objectives. No doubt, in the future, there still will be need for scrutiny of education in the field of pharmacy, but the progress made thus far will lessen the problems that will arise in the future.

There have been many more studies of recent origin in each area of pharmacy. These have been presented at the annual meetings of the Teachers' Conferences of the AACP and to some extent in the sections of the A.Ph.A. A move of considerable importance was the establishment of seminars in the various areas of pharmaceutical education. A full measure of credit must be given to the seminars for producing valuable material and information which will be used in the continuing advancement of pharmaceutical education. Unfortunately, some parts of some seminars are in need of more careful planning and selection. The entire profession of pharmacy should be thankful to the American Foundation for Pharmaceutical Education for sponsoring these worthwhile programs.

In recent years the younger educators in pharmacy have accomplished very much and are doing a wonderful job of improving the teaching and educational programs by raising them to a much higher level. By broadening the courses, stimulating the students to achieve greater benefits, and encouraging them to maintain the highest ideals of their profession, pharmacy will attain its rightful place on the health team.

There is no need to dwell upon the remarkable advances made in the older established areas of pharmaceutical education because you are well

aware of the achievements. Advances in these areas have been easier to promote and accomplish because they had established foundations and a basic structure upon which to build. Pharmacy, pharmacognosy, pharmaceutical chemistry, and pharmacology or biological science are basic or core studies in pharmacy. However, when you introduce new areas of education that are necessary for the pharmacist of today, situations and problems arise that require careful attention and study. Nothing will be said about another new area of education in pharmacy commonly referred to as the cultural courses since this paper is to be concerned with business courses in the pharmacy curriculum.

It might be of historical interest to record the early beginnings of business courses in the pharmacy curriculum, but I did not do this for this paper. It is known that many colleges of pharmacy as far back as 1900 did have courses such as pharmacy law, commercial pharmacy, etc. This section was known as commercial pharmacy or pharmaceutical economics, but it was never a very prominent section because the introduction of business courses in the pharmacy curriculum was never well received by many educators in pharmacy. Some educators were of the opinion that the prestige of the science courses might be lessened or that the interest of the student might be diverted from his professional courses. Today we know these opinions were unfounded.

It is unnecessary to review what has taken place in the past fifteen years concerning the development of accredition standards and the increasing standards for facilities, equipment, teaching personnel, curriculum, quality of courses, textbooks, and student admissions. Numerous other factors have contributed to the progress which has placed the colleges of pharmacy within the circle of accepted collegiate education.

The new era in pharmaceutical education has ushered in new problems and a few new conflicts. The latter arise when a decision must be made concerning the type and number of courses to be established. Because we have diverse opinions and various arrangements of one plus four, two plus three, and five year integrated programs, only one of which conforms to sound professional educational procedures, we meet problems of sequence, hours permitted, etc. More conflicts arise when the practicing pharmacists, many of whom have never been formally trained in pharmacy, want to dictate the educational programs to be followed for future pharmacists. Among the newer problems we find the question of the proper division of the curriculum into subject areas and the possible need for inclusion of new subjects or even a new area.

Pharmacy administration is the accepted title for the department of the college of pharmacy which is responsible for preparing the graduate to take his place primarily in retail pharmacy and to have some foundation concerning the routines of business in contrast to the professional aspects of his calling. May I offer these few opinions and suggestions. Some of these, if acted upon, may ward off a new wave of criticism about our educational endeavors.

From the chapter entitled "Pharmacy Administration" in *The Pharmaceutical Curriculum*, I quote as follows.

> Pharmacy administration selects from the great wealth of information on business administration, law, and ethics these facts and principles that are pertinent to the maintenance and operation of a pharmacy and adapts them to its purposes. Moreover, it develops certain additional facts and principles of its own . . . that are distinctive in the management of a pharmacy. It does all this from the point of view of rendering professional pharmaceutical service to the public (1).

Yet, from the same source, I quote:

> . . . modern pharmacy is a merchandising enterprise . . . in a highly competitive field . . . and has numerous business and financial relationships. . . . success in operating . . . depends . . . upon his ability to use the same managerial principles and tools that are employed in merchandising generally (2).

If the courses under pharmacy administration are to be specialized in nature, we ought to be certain that this is well understood by all educators. Greatly abbreviated courses in pharmacy administration are most likely to be dangerous. Can we prepare the graduate to meet these competitive conditions? Do we afford him the opportunity of learning how to use the "tools" and study the "managerial principles" that are employed in competitive business? I do not think we do or can do it with the limited courses and the hours allocated to pharmacy administration. If we are to do the job expected of us, we need more hours and more teachers in this area.

What are the business courses that should be in the pharmacy curriculum? To answer this, we must approach the problem with two points of view or objectives. First, if we want to establish the business courses in the curriculum in such a way as they will have transfer credit or be accepted in the colleges of business, then we must have qualified teachers to teach, and the subject material and textbooks should conform to a standard. In doing this, the course hours immediately are established to conform to those in the business schools. Therefore, the course titles will be definite. On the other hand, if we merely want to acquaint the student with fundamentals of business and reduce the hours for such courses, then we ought to adopt names for the courses which are not misleading. The student should understand that he is getting a specialized and abbreviated course. Whichever objective you choose, the number of courses will differ.

I hesitate to include economics in the pharmacy administration allotment of hours because this subject is philosophical in nature and should be foundational for all college students; therefore, it would be in a pre-pharmacy course.

Pharmacy law, to use only one of the many titles under which this subject is taught, should be extended sufficiently to give the student a broader education concerning the way in which law is connected with his everyday operations. Consequently, torts, agency, contracts, and the various laws which specifically regulate pharmacy or by which pharmacy is affected should constitute the course. To do this would require a minimum of four hours credit over two semesters.

Courses which can be managed separately such as salesmanship, advertising, and basic accounting are necessary for the pharmacist. These could be of the condensed or abbreviated type with an allotment of three semester hours to each.

A course not found in the pharmacy curriculum but one which has merit would be one dealing with finances. Money and banking is a common title for such a course, and it is a basic course in the business schools. I believe

such a course for pharmacy students would warrant consideration. Perhaps three semester hours would suffice.

Personnel management and public relations are both subjects of much importance in business. However, I would not devote hours separately to these courses because some parts of each may be included in advertising courses or in pharmacy management courses.

This leaves two more courses for consideration. The first of these is marketing. Since marketing is a function of management, it should be coordinated with the other activities of the business. However, marketing as a separate, abbreviated course might be desirable, but it can be included in drugstore management. Drugstore management is a very broad term to use, but it can be confined to specific purposes, namely, the problems of personnel, merchandising, promotion, and management in the retail pharmacy. Such a course will require six semester hours if the full benefits are to be offered to the student.

There is no doubt that the student should be permitted some choice in courses in this area. To do this it is advisable to have elective courses. Among these electives might be institutional management, statistics, production controls, business English, and advanced courses in economics. These may be permitted as alternatives to those courses in the established program.

It is my opinion that pharmacy law, salesmanship, advertising, money and banking, accounting, and drugstore management are the six courses which might well be the task of the business administration department of any college of pharmacy. To accomplish this assignment, the total number of semester hours required would be twenty-two, leaving the course in economics to be considered in the pre-pharmacy curriculum.

In conclusion, may I offer this observation. You could not include these courses in a three year professional program in pharmacy without overloading the student. In so doing you would lose the benefits derived in both professional and allied courses. However, if the educators in pharmacy had realized that a complete revision of curriculum was needed and had we decided just what kind of a student we wanted to produce, we would have adopted the four year course without hesitation and still required the two years of pre-pharmacy for admission to the professional school.

Perhaps progress is the result of dreams, and I close by being a dreamer in this field of education.

REFERENCES

1. Blauch, L. E. and G. L. Webster, "The Pharmaceutical Curriculum," American Council on Education, Washington, D.C., 1952, p. 169.
2. *Ibid.* p. 170.

Business may make an effort and be satisfied to go on "as usual," but education should forge ahead at all times.

Hugo H. Schaeffer, Am. J. Pharm. Ed., 15, 78 (1951)

PANEL: EXAMINING STUDENTS IN COURSES IN PHARMACY ADMINISTRATION*

METHODS FOR GRADING AND EVALUATION OF ANSWERS

MELVIN W. GREEN

I suppose that there are others of you that have the same inability that I have to say "no." Mrs. Hall asked me if I would participate in this discussion, and I said "yes" before the full impact of my ignorance hit me. I suddenly realized that I knew very little about testing and even less about pharmacy administration. I am the expert in reverse, for I know less and less about more and more.

To discuss evaluation of achievement ordinarily one begins by comparing essay-type questions against the so-called objective type; one brings out the techniques for grading on the curve and a host of other things that constitute the examiner's bag of tricks. I propose to develop the subject somewhat differently, more diffusely, and more subjectively. You probably think this is not very helpful, but if I had stuck to the methodological approach, I assure you, it would have been even less helpful.

There is a spectrum of reaction to examinations and tests by teachers. Some teachers would destroy all IBM machines and instruments for paper grading and burn all blue books. This group takes the position that examinations measure nothing except a person's ability to regurgitate and that, at best, a grade of 75 per cent means that the student knows enough teacher psychology to convince the teacher that he knows 75 per cent of that which he was asked. This teacher gives a test as infrequently as permissible and under protest.

At the other end of the spectrum is the professor who is characterized by the students as being "exam happy." The rest of us fall some place in between.

While I have seen a good many examinations, I have never consciously studied pharmacy administration examinations in particular. Some of the tests I have seen were unusually good and some very poor, but the largest number are probably run of the mill. The strongest impressions that I have from such an informal survey is that the best examinations are related closely to the objectives of the course. When the course objectives are largely factual (i.e., if the student is supposed to be familiar with a large body of facts and ideas), the test is one designed to determine how many of those facts the student has acquired. If, on the other hand, the course is designed to teach a student to think professionally, the testing is geared to that concept. Probably the objectives of no course take one pattern or the other exclusively, and the more ideal test reflects the ratio of the two concepts, at least approximately.

I would think that examinations in pharmaceutical jurisprudence, for example, would be largely the factual type for it is important to know precisely the state, federal, and, perhaps, local laws affecting pharmacy. In the area of store management, however, one meets less fact and more opinion. Here one meets more frequently cases or situations about which the student can reason rather than regurgitate facts. Marketing would appear to me to be an area where the two testing procedures are more nearly equally combined. In accounting, if the objective is to be able to keep a

*Presented to the Section of Teachers of Pharmacy Administration, New York City, 1957.

set of books, a practical test in entering, trial balancing, etc. might be in order. If the objective is more interpretive, the student might be required to analyze a profit and loss statement or other instrument.

Probably the most difficult test to devise is the so-called objective test. Clear, concise, and precise language is called for to prevent ambiguity. Two material advantages are gained, however: an easy way to ascertain the student's knowledge of many facts and quick, easy grading. Such tests can be so constructed that they measure a person's ability to analyze and synthesize from facts also. The essay type of examination, while easier to construct, is difficult to grade. It does measure more satisfactorily, however, the student's ability to analyze, synthesize, and express himself in situations involving sustained thought. All too often, however, little advantage is taken of this last property. This is unfortunate for there is a need for more literate pharmacists.

When it comes to grades, the only absolute grade possible is with objective tests and arithmetic or mathematical problems. In the latter case, it has been shown that even with such problems there are often differences in grades assigned dependent upon values assigned to errors, misplacement of decimal points, and the like.

Grades are usually given in letters or in numbers and, if in the latter, either in per cent or some arbitrary scale such as the one on the basis of five or ten. In the latter case it should be emphasized that when the numbers are used as a code, they may not represent true arithmetic relationships and hence an average or other statistic really has no meaning.

In addition to the more formal means of evaluating there are informal means such as the observation of students, the teacher's own estimate, the students' reaction to learning, and students' performance in subsequent pursuits.

In connection with this topic it is of practical importance to distinguish between evaluation and measurement. The effect of mistaken identification of the two is still felt in many quarters and leads to the persistence of strong feeling for and against objective testing and for excessive reliance on examinations in estimating academic accomplishments. Presently a more balanced view has come to prevail finding room for both measurement and the more qualitative kind of evaluation based on personal judgment.

The objective approach, spawned largely by Thorndike and by J. McKeen Cattell, brought striking results by producing scores of measuring instruments, by focusing attention on the range of individual differences, and by contributing to the improvement of instruction, guidance, supervision, and administration. However, in the balancing of views there has come about the realization that there is much in education that cannot be measured objectively and precisely, which in fact cannot be measured. To ignore this in evaluation may be to overlook much that is significant in human behavior. Since people are commensurable only in specific and relatively superficial aspects and motivation is scarcely measurable at all, it is evident that objective measurement is only a partial way of learning about people. Therefore, subjective judgment is something to be trained, controlled, and responsibly exercised. In fact, objective measurement is enhanced if coupled with or interpreted within the broader context of evaluation from a many-sided study of the individual.

EXAMINING STUDENTS IN COURSES IN PHARMACY ADMINISTRATION

JOHN F. McCLOSKEY

In preparation for this panel separate papers on multiple choice, true-false, essay, arithmetical, and problem and case study types of examinations were prepared. It was found necessary to use only one of the papers. I presume a presentation dealing with problem and case study examinations was requested because there is some interest in the case method of teaching. I have used this method in a limited manner for over fifteen years and have found it very interesting and useful for the student. It is quite stimulating also for the teacher.

John L. McCaffrey, President of the International Harvester Company, at the fiftieth anniversary of the Chicago School of Business, said, "There are three fundamental things a business man ought to know and that every school of business ought to try to teach:

1. Nature and necessity of profits—not only how to earn a profit, but why it is good for everyone for a profit to be earned.
2. How to get along with other human beings, both as individuals and as a group. Some of this can come from experience, but much can be taught.
3. Know enough about the society in which he lives and operates so he can follow changes intelligently, and adjust himself and his business to changing times—making sure his business serves its most useful purpose to society."

Later, Henry Ford II, addressing the Wharton School of Finance and Commerce on December 3, 1956, said, "The danger of education at the college level is that, in our predominantly industrial society, technological schooling—including business administration courses—will be overemphasized to the detriment of the liberal and fine arts. A sound liberal arts background helps to build the well-rounded man needed to take over the complex responsibilities of leadership in this modern age."

The proper use of the problem and case study method can come very close in supplying many of the requirements as indicated in the above statements.

The case method is not very old. It became quite popular through the efforts of men like Teele, Culliton, Copeland, McNair, Lozo, Mallot, Gray, Donham, and others. Business schools have found this method most useful, and perhaps the courses taught in pharmacy administration may find them equally useful, interesting, and instructive. The case method shows the process of business decision making, and it affords the opportunity to recognize the social discipline. It teaches the student that before acting he must weigh a variety of considerations both for the short run and for the long run. Likewise, he must assess the facts, make an analysis, weigh the considerations, and then reach a decision.

I know the case method is interesting to the student because it is real, lifelike, personal, and deals specifically with concrete questions. All students participate and all contribute something, thereby stimulating the competitive spirit. Very soon the students want to hear what other students have to contribute and less of what the instructor has to say. The case method can develop business intuition, insight to judgment, and the careful use of words to explain their contribution.

The case method expects maturity which is not always present in younger students, but by the same token it becomes most useful in a graduate program. The case method calls for more skill on the part of the teacher than upon his knowledge. The case method teacher will recognize the seven sins of the method which are: condensation, sarcasm, personal cross examination, discourtesy, self-approval, self-consciousness, and talkativeness.

Grading should not be attempted during the class discussion, but grades are established on the accumulated impressions. If all students do not participate, a record should be kept to encourage nonparticipating students to contribute something. Closer grading estimates can be obtained by requiring written reports on cases to the extent of from three to five per semester.

The case method is likened to laboratory teaching. Law, medicine, sciences, and pharmacy have such laboratory courses, so why not apply the same principles to pharmacy administration.

The preparation of cases or problems is not an easy task. It is extremely difficult to prepare cases that will stand up under the close scrutiny of experienced teachers in this method. Cases can seldom if ever be prepared by the undergraduate student. The graduate student cannot do a complete job in most areas. The combined efforts of several persons usually make the best cases.

I have attempted to touch only the highlights of the method of evaluating students, but I recommend that teachers try a few cases if they want to see what a remarkable change can come over a class. Likewise, one more suggestion for teachers in science areas—take time out and carefully peruse the texts in the field of education, especially those parts pertaining to the measurements of student abilities or just plain methods of making examinations.

CONTENT OF EXAMINATIONS

ROBERT V. EVANSON

Effective teaching involves so many factors with respect to examinations that there is probably no such thing as the perfect examination. However, every teacher aspires to compose the best of his efforts into a test that will measure both student knowledge and teacher effectiveness. To do this the teacher must establish definite policies which will govern the general nature of his exams. Perhaps some of his policies will more or less foster a reputation for the teacher.

Four basic general policies are necessary for regular examinations. The test should *cover* the material being considered and studied in order to be fair as a sampling of the student's knowledge. The exam should *cover* the total period to be used and not provide too much free time for undue checking and/or dawdling. The questions should be properly weighted unless the sample is large enough and objective in type to give every question the same weight. Finally, the test should be organized and composed in such a manner as to stimulate the desired response which is definite enough to be graded fairly.

To satisfy these objectives the content of an exam may consist of various types of questions classified under three main headings as essay, objective, and case studies. Essay questions may range in response from a short para-

graph to many pages. Objective questions may include short answers, true-false, multiple choice, matching, scrambled items, completion, or variations of these. Case studies may include both essay and/or objective answers.

The building of an examination should be a positive project which utilizes one or all of the types of questions necessary to do the job effectively. Too many times a teacher backs into a test or composes it for reasons other than testing knowledge. Essay tests, supposedly simple to produce, are often difficult to grade; therefore, the teacher uses an objective test. Objective tests are quite simple to grade, but they are tedious and lengthy to produce. This length of preparation sometimes dictates the undesirable practice of re-using a test whether or not it is returned to the students and subsequently filed for future use by future classes. Case studies are not too difficult to prepare, but they sometimes elicit plausible opinions and solutions that the teacher is not prepared to accept for credit.

The essay question can be used best for material which requires discussion of some or great length to indicate an understanding of certain factors, definitions of important terms, expansion of certain theories, or any open-end situation which elicits either or both rote memory fact and reasoned opinion. The question must be so worded that the student receives a definite mental picture of the information desired. Another good use for such questions is to ask a general question for the purpose of checking the students' usage of the English language.

The case study or case problem is very well suited to examinations in pharmacy administration in its several areas of study. This type of question should be used to measure ability to think logically: that is, to analyze, evaluate, and come to some sort of decision. A set of circumstances is devised for which the student must know the expected solution, formulate the most desirable solution, devise a reasonable plan of action, or state some definite opinion. Cases which combine text, lecture, and experience along with perhaps odd names or some humorous expression offer a delightful change in exam style and content and also can do much to relieve periodic tension. This can be illustrated by the following type question: Mr. Tired Blood shuffles into your drugstore in Lafayette, Indiana, and asks for a bottle of Geritol and four ounces of *Cosanyl* by Parke, Davis & Co. *Cosanyl* contains Ethylmorphine HCl 1/24 gr. per 5 cc. and is a cough preparation.

EXPLAIN: 1. Is this an exempt narcotic preparation, and why?
2. If it is an exempt narcotic preparation, what information must be recorded in the exempt narcotic registry book?
3. If the customer returns four days from now to have his order refilled (that is, to buy another bottle of *Cosanyl*), could you legally sell him another bottle?

The various types of answers and information for these three questions are obvious to a pharmacist.

The advantage of the case is its ability to provide a reasonable picture of the students' knowledge of many subjects, adaptability to a situation, and oftentimes an insight into their personal philosophy without necessarily being aimed point blank at one of these items. For example, a case involving an apprentice or intern who fills a poison prescription in the absence of the pharmacist can show the knowledge of compounding, dispensing, poison dosage, and pharmacology of the poison in addition to the information relative to state law, negligence—a tort violation—and professional ethics.

The objective test is best suited to a broad sampling of the students' knowledge of the total subject matter. It provides some idea of the students' overview of the subject, and although much has been said about the elements of cheating and guessing, such type exams are of value in testing mental reactions to specific material. A well-constructed exam can be very difficult to prepare, as well as difficult to answer. On the other hand, objective tests can be so easy that the results do not indicate anything of real importance.

One excellent usage of objective questions combines them with the reason "why." True-false questions are simple to answer as such, but when coupled with the demand to change the false to true, or the requirement of stating the reasons for the answer whether it is true or false, the instructor has an insight into the students' knowledge, and the element of guessing is reduced to a minimum.

Subject matter is very important to proper test content; however, the type of questions used to cover the subject matter is also very important. The exam content which best measures the students' learning experience and a teacher's effectiveness combines both material and method in such a way that every question constitutes the best type of question to stimulate the response that will measure ability, knowledge, and reasoning in the proper proportions.

No student can complain if he fails a fair, over-all sample of the material after taking a well-constructed examination which has proved his lack of knowledge, ability, or reasoning. However, every student who does well on such a test will have a personal pride in doing a good job for himself and will have a feeling of both satisfaction and self-confidence.

METHODS OF GRADING AND THE EVALUATION OF ANSWERS

FLOYD A. GROLLE

The problem of grading students is one close to all persons involved in the field of education. The dean, in a position to view the total grading results of his school, may find that some instructors are "too easy" in grading while others are "too tough," or that the total distribution of grades does not fit into the shape of the "normal curve." The instructor is the one who feels the problem most keenly. In the final analysis, the fingers of the students, dean, and sometimes the parents are all pointed toward the instructor because it is his task to determine grades. It is difficult to keep everyone concerned satisfied, because each views the problem in a different way. It is important, however, to recognize that each viewpoint has some merit.

The most striking example of looking at the problem in different light is shown by young teaching fellows and assistants. It is interesting to see the sudden change in their philosophy on the matter of examinations and grading. As students, many viewed exams as a nuisance, or as traps contrived by instructors. As teaching fellows and assistants they immediately recognize the advisability and necessity of exams, with the resulting difficulties of grading them. The instructor who becomes a dean acquires a fresh look in viewing the problem from the top of the fence.

There are many ramifications to this problem. It is our purpose to

discuss the problem of grading from the viewpoint of the instructor, while trying not to lose sight of the viewpoints of the other groups involved.

What factors are to be considered in determining a grade? Should a grade reflect only scholastic attainment in a course or should we also consider such factors as promptness, cooperation, industry, neatness, and participation?

We all recognize that the aims of pharmaceutical education go beyond the mastery of the subject matter. It is also agreed that instructors should try to develop in their students high ideals, healthy attitudes, and good moral character. Yet these outcomes are intangible, with the result that the instructor is never quite sure to what degree they are actually being realized in his students. Since they are so intangible, the instructor has no way of measuring them other than to rely on his subjective judgment. Therefore, he is treading on soft ground when he categorically assigns a specific weight to such outcomes in determining final grades. Moreover, some individuals hold that the development of these traits is automatically reflected in a student's achievement. In other words, if he is prompt and neat with his work, if he is cooperative and active, if he is industrious, his achievement level will automatically be higher than that of other students of the same ability who are not developing these traits. Many educators hold that because of this, a student's grade should reflect only scholastic achievement. However, there is a way in which these intangibles may be given some weight in making up the final grade.

If the instructor samples the student's knowledge of important topics through the use of the unannounced quiz, the hour examination, and the final examination, he will have a great deal of data on which to arrive at a final grade. There may be a typical circumstance to take into consideration in some cases, but, on the whole, the instructor can consider the following factors in arriving at a grade: (1) scores on hour examinations; (2) the student's daily work, as measured by unannounced quizzes and written assignments; and, (3) the score on the final examination. The weights assigned to each will depend upon a variety of factors such as the number of examinations given and the amount of written work assigned. It is necessary for each instructor to place due emphasis on any other activities which should be graded, such as special projects, oral reports, or term papers.

Depending upon the grading system adopted by the school, the instructor is now ready to correlate his objective data and to assign a tentative grade of "B," "89," "above average," etc. Before doing this, he should sit back, take a "last look," and concentrate on those students whose grades place them in the borderline or failure category. Assume that the student's grade is 85 or 86 in the C category, and that 87 represents a B; or that 70 is a passing grade and that the student's tentative grade is 68 or 69. Here is a case where the instructor could give weight to some of the subjective factors that were not considered previously. If the attitudes and contributions of the student were of a caliber to place him in the next grade category, it should be done. If class work and attitude were representative of the tentative grade assigned, that grade should be final. I do not believe it is wise to lower a tentative grade on the basis of subjective judgment. The student has already achieved that grade on the basis of objective

data. Final subjective evaluation of the student has the advantage of making grading more than just a mechanical procedure, for extenuating circumstances may be considered by using this procedure. The student does not have much room for complaining, for he has received what is due him on the basis of objective evidence.

There is another problem to be considered in the matter of grading. It is not unknown for a dean to inform the instructor that his grades are too high, too low, or that there are too many failures or too many A's. This brings up a basic philosophy of grading. Should instructors mark on an absolute scale of 0 to 100 and give the student what he earns regardless of the distribution of grades, or should a relative scale be used, placing the students in rank order and award a certain percentage of A's, B's, C's, D's, and E's.

The relative scale of grading utilizes the normal curve concept. Following the normal curve concept, a sample of students exhibits a range of ability which extends from the inferior on one end to the superior on the other end of the scale. The extremes of the curve comprise a very small percentage of the total. Below the superior are found a large number of students who might be classified as above average, and, likewise, from the other end of the scale there are a like number who might be classified as below average. In the middle, between the extremes, is the largest or average group. When the normal curve is used as a basis for grading, the instructor is assuming that his class represents a range of ability similar to this theoretical distribution. The instructor, then, like a robot applies "accurate" statistical procedures in order to mechanically assign grades. There are many recommendations on percentage of grades that should constitute each category. A common distribution is as follows: A—7 per cent; B—24 per cent; C—38 per cent; D—24 per cent; and E—7 per cent. Another is: A—10 per cent; B—20 per cent; C—40 per cent; D—20 per cent; and E—10 per cent. Some feel a more accurate method is to calculate the mean and standard deviation of the distribution of grades, and then to use these as a basis for assigning grades.

Some instructors use the normal curve because they do not want to appear to be using outmoded methods in grading; others use it to eliminate the subjectivity in grading. Administrators sometimes ask their staff to grade on this basis. I have heard an instructor complain about the fact that the students have "hit the exam," and, therefore, he has little justification for giving them the lower grades which are mandatory in a normal distribution. They are slaves to their own methods. The instructor should always be just in his grading. This is paramount. Grading by the normal curve seems to violate this principle. Before the semester begins, the curve stipulates the distribution of grades. The normal curve is a mathematical ideal which does not necessarily have a counterpart in reality. There is no universal "law" concerning the form of frequency distributions in general. From the literature of education and psychology many educators have been led to believe that the normal curve distribution is an answer to all their statistical ills. The "law of normality" may be safely applied only to certain types of chance data, or to certain types of "errors" in the quantitative analysis of psychological and educational data.

With these facts in mind the instructor should hesitate to use the normal curve for grading purposes. A sample of high school students may be nearer "normal" than a sample of college students. Because of the mortality rate of the less capable, a junior pharmacy class may be less "normal" than a freshman class. As higher admission standards are applied the sample will deviate more from the "normal." A more skewed distribution could be expected with students that were pre-selected. The instructor should not become so engrossed with the statistical aspects of grading as to lose sight of the real factors of intellectual caliber and growth in the student.

Some instructors have been so preoccupied with these statistics that they have been blinded to the fact that students are human beings. They preach about the necessity of treating a student as an individual, taking into account his varied interests, aptitudes, and abilities, and then disregard all of this by figuratively tossing his body into a frequency table and processing him as a juicy statistic. Well, after all of this, what should be the basis for grading? The standard for the course should be the teacher, not the normal curve. An experienced instructor soon learns what he can expect of the group with whom he is dealing. Of course, there are exceptions. Some instructors have standards that are too high; others have standards that are too low. If his grades are consistently high, he might well refine his tests unless, of course, he is working with a select group. If his grades are consistently low, his examinations may be too difficult, or he may not have taught the material as well as he had envisioned. The grading dilemmas of some instructors are brought about by lack of sufficient evidence of the students' accomplishments. There are some instructors who use the lecture method exclusively and base their grades on one or two examinations during the semester period. They have not sampled the students' achievements adequately. The remedy seems obvious. The instructor who gives frequent short quizzes, two or three major examinations and a final examination, and who creates stimulating classroom discussions, will have sampled his students' achievements sufficiently to be able to award grades with confidence. At the same time, his class discussions will have given him some knowledge of his students as individuals and will have made his class time more interesting and instructive.

Evaluation of Answers

The second portion of this discussion deals with the evaluation of answers. The answers given to objective-type exams such as multiple choice, true and false, and the arithmetical examination are rather easy to evaluate. In some cases the evaluation of an arithmetical answer may present some problems. Should full credit be given for the method even though the answer was incorrect? No one can categorically say yes or no. It is obvious that it depends upon the amount of subjective thinking required before the actual calculation is begun. A simple mistake in arithmetic is not grounds for complete loss of credit on the question. It is my policy to mark 75 per cent on analysis and interpretation of the work up to the point of calculation and 25 per cent on the answer. This is sufficient emphasis on the right answer to detour the philosophy that the final answer is not important. In some cases pharmacy students are orientated in other courses that the answer must be correct regardless of the "road to the end."

This counterbalances the "all method and no answer" philosophy. There are two general methods of evaluating the answers to essay examinations. One method is called quality marking in which the answer is judged as a whole. The marker awards a score of A, B, C, etc. on the total impression made by the answer. This procedure is used in connection with each essay question on the examination or in some cases the examination consists of a single broad question. Analytical marking uses the procedure of scoring specific characteristics expected in a complete or acceptable answer. In scoring some types of problems or case questions this method is rather difficult to apply. When applicable the analytical method gives the most reliable evaluation. Dr. Robert L. Ebel, Director of University Examinations Service, State University of Iowa, discusses the possibility of the general change in the score level of severity or leniency while dealing with essay questions. He writes:

> Most raters are conscious that such changes can occur. One reads a particularly poor answer and decides that the group as a whole has failed to achieve an adequate level of mastery. He consequently begins to grade with greater severity. Again, a succession of low scores may lead the rater to assume that his standards are too high, and that he ought to ease up somewhat. These changes in general level of severity in grading cannot be prevented completely, but the scorer who is aware of them can minimize their influence. One very effective technique is to grade one question at a time through all papers before going on to the next question. When this is done, the effect of a change in the level of severity does not affect a few students as severely as when all questions on a single paper are graded together. An added advantage of marking one question at a time through the entire group is that it facilitates establishment of relative standards for grading the answers, and thus insures greater uniformity in grading from paper to paper (1).

Before marking a particular question, it is advisable for the instructor to list the points which he thinks constitute a complete or acceptable answer. Then he should scan the answer of each paper before attempting to mark the question. This will give the instructor an over-all picture of the question's interpretation in addition to the completeness of the response. This may be criticized as too time consuming, but it does indicate the instructor's conscientious effort to interpret the student's answer. For a large class it may be found more expedient to scan only a sample of the papers.

It is a natural tendency to allow handwriting, neatness, spelling, etc. to affect subconsciously the marking of a particular response. If these factors are not an integral part of the course, they should be discounted in arriving at a final evaluation. It is the responsibility of the instructor, however, to point out these items to the student.

The name of the student whose paper is being marked, or in some cases the handwriting, may affect the question's final evaluation, although many instructors pride themselves in the fact that they are completely objective in their marking. In addition to marking each question separately, the papers should be shuffled in some manner upon the completion of each question, in order to reduce the possibility of a student's paper being marked first, last, or in some fixed order. If at all practicable only the instructor who is actually teaching the course or section should mark the papers of that course or section. It is doubtful whether any person can mark the papers of another man's class without seriously undermining the proper evaluation procedure. Have you tried explaining to a student why another teacher has failed to give credit when the student's answer coincides with your statement in class?

Summary

The following should be noted when marking essay-type examinations: (1) Before beginning to mark a particular question, list the points that will be used in the evaluation. (2) Scan the answer of each paper or a sample of papers and compare with the marker's own list. Make any revision in the complete or acceptable answer that is necessary. (3) Conceal the student's name. (4) Mark one question at a time. (5) Shuffle the papers after marking each question. If we follow these simple steps, I believe we will do a more consistent job of evaluation.

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The academic color of pharmacy is olive green which is the blending of the blue of philosophy, the yellow of science, and the white of art. May we develop our educational pattern so that it will truly represent the "olive green of pharmacy."

Edward C. Reif, Am. J. Pharm. Ed., 18, 313 (1954)

STIMULATING STUDENTS IN PHARMACY ADMINISTRATION*

LOUIS E. KAZIN

We believe that all of us can accept the premise that the depth of undergraduate appreciation for pharmacy college course work is directly related to the success the instructor achieves in implanting in the student mind the practicality of the classroom material with respect to its application in the field.

One recognizes that within the framework of this premise, there is ample opportunity for the teacher in pharmacy administration to develop a high degree of student interest. The fact that the profession of pharmacy is practiced in a commercial atmosphere should, in itself, provide the desired impact.

However, we are of the opinion that there is a broader area to explore in what should be a more or less perennial search for ways and means of stimulating the student's appreciation for his pharmacy administration college program.

This involves his mental outlook as he views the commercial or merchandising departments of a typical retail drugstore and their importance to pharmacy practice in general. At this point we're not dealing with those phases of pharmacy administration instruction concerned with broad economic and basic concepts which can be applied to the over-all conduct of any business or professional activity. Rather, we are concentrating on the so-called up-front departments which tend to develop in the student's mind a conflict of interests which, if improperly resolved, may well hinder his future professional and economic progress.

That such a conflict between merchandising, business and professional activity exists in the pharmaceutical field is self-evident. Whether we have taken the necessary steps to place these activities in their proper perspective for better student understanding is a question which cannot be as readily answered.

The increased importance of pharmacy administration courses within the pharmacy college curriculum is evidence of progress in one direction—a very necessary and basic direction, we hasten to add. There is every reason to believe that when the five year undergraduate program becomes effective, additional credit hours will be made available for instruction in commercial pharmacy courses. In spite of these evidences of academic recognition of the important role played by business or commercial activities within the retail drugstore, there exists in some quarters a more or less collateral negative interpretation of these same commercial functions.

More specifically, we believe that there is a tendency to assume that the merchandising or up-front areas usually associated with retail pharmacies are established and maintained on sufferance, and, given the opportunity, most pharmacists would eliminate these departments. It is further implied that these departments, as distinct from prescription or other pro-

*Presented to the Section of Teachers of Pharmacy Administration, AACP, New York City, 1957.

fessional areas, are accepted solely on the basis of their ability to provide necessary financial income towards the maintenance of the prescription department.

This concept of how the pharmacist thinks and acts has been allowed to stand in our field for too long a time. We believe it needs re-examination on the part of all those interested in the future professional and economic success of our pharmacy graduates.

It is true, of course, that all retail pharmacies in the country would not be able to exist solely on the income derived from professional services. As such, the commercial areas contribute to the profession's financial well-being. However, one might ask, is this the complete story behind the business and professional dichotomy inherent in the retail drugstore.

Isn't it a possibility that many retail pharmacists enjoy their merchandising and business activities? Aside from the financial income derived from these areas, there are many personal and prestige service opportunities made available to the local communities as a result of these drugstore departments which otherwise might be nonexistent in a given locality. Furthermore, many pharmacists have pointed out that the merchandising departments within their drugstores provide them with an independent financial and professional status which would not be possible if their pharmacies were restricted solely to the prescription department and other strictly professional areas.

In other words, if all pharmacies were of the prescription-only type, our profession would be so completely dependent on the medical practitioner as to make the independent retail druggist a thing of the past.

Is this complete dependency on the medical practitioner for financial and professional security a desirable development? The answer, of course, is obvious.

Let me go back to the point we made a few moments ago with respect to those retail pharmacists who enjoy the competitive challenge encountered in the merchandising departments. In many of these areas, there are overlapping professional services in which the pharmacist's specialized training and ability makes for a more efficient application, administration, or usage of products on the part of the customer. We might mention the baby department, toiletries and cosmetic sections, and even the photographic department.

One can't help but think that sometimes we expend too much of our energy and effort in remaking the profession of pharmacy in such a fashion as to force us to conform with other types of professional activity. Wouldn't pharmacy be better served if we spent more time emphasizing the distinctiveness of the American drugstore and its ability to provide professional and business services within a structure which has been part of the American scene ever since the birth of our country? In a competitive system such as ours, no service or function exists unless it provides a basic economic and professional need—the permanency and tenure of the American drugstore speaks for itself.

We are not unaware that we have more or less oversimplified a great many factors which are subject to various interpretations in different sections of our country. However, we do believe that there is need to give greater emphasis to the points we've mentioned.

Pharmacy's future strength will depend upon the abilities of its practitioners to establish a balance between those commercial and professional departments which go to make up the typical retail pharmacy. Interest in, and appreciation for, pharmacy administration courses can be greatly heightened during the pharmacy undergraduate program if this fact and all those forces which help achieve such a balance are presented within the framework we've described in this brief paper.

As we see it, the role of the pharmacy administration teacher will become a most demanding one as prescription volume moves upward and competitive challenges from nondrug outlets increase. There may be a tendency to move too precipitously in one direction on the part of our pharmacy graduates. To some, this might signal professional and financial failure. Here again we point to the need for impressing upon the student the desirability of achieving proper balance between professional and business areas in his retail drugstore, and any move that he might make should conform to sound and tested business principles.

May we suggest, in closing, that the pharmacy undergraduate never be allowed to forget these facts as he proceeds under your guidance to enter his chosen profession.

Far too many educators avoid involvement with organizations and activities of the rank and file in pharmacy. We loudly decry their failure and their mistakes, but only rarely do we assume active participation in these groups and try to occupy a position of leadership, which is often sorely needed.

Linwood F. Tice, Am. J. Pharm. Ed., 19, 796 (1955)

DEVELOPMENT OF A PROGRAM TO STIMULATE INTEREST IN PHARMACEUTICAL MARKETING AND MANAGEMENT*

ANTHONY T. BUATTI

Since the late 1940's, there has been a rather extended revision of the pharmaceutical curriculum. The technological advancement in this field has introduced many new concepts which necessitated changes in the teaching of the subject matter, with the result that we now have a more technically trained, professional pharmacist. In line with this there has also been a more latent, but strong movement toward giving greatly improved courses in pharmacy administration. Significantly, a larger number of arts courses have been introduced. All of this is directed toward a fully rounded pharmacist. That this has been not only desirable but necessary is readily accepted. However, it has created certain adverse effects. On entering the retail field the graduate pharmacist finds a conflict between his highly developed education background and what is practiced in the field. As a matter of fact, many students become conscious of this apparent gap before graduating, and, as a result, resolve to enter other sectors related to pharmacy.

For the last three years we have attempted to solve this problem. In order to cope with the situation, several assumptions had to be made. One assumption is that these students did not want to become retail pharmacists and also did not desire a career in scientific pursuits. It is then possible to begin a program designed to introduce these students to the possibilities afforded by the field of pharmaceutical administration.

A second assumption is that there is a problem in exploring the possibilities in the field of pharmaceutical administration with the students. If any future is to be found in this area of pharmacy, it must not be approached via a pressure-selling technique. The students should be exposed to the availability of careers in this field, but they should not be pressured into it simply because they are uncertain of the future in retail or scientific jobs.

The third assumption is that it is the task of the educator to resolve this problem from both the viewpoint of the demands of industry and of the supply of students who are willing and able to satisfy the demand.

We can begin the discussion of the development of the program by enumerating the several steps that can be taken. Field trips have proven effective in introducing the students to the intricacies of operation of pharmaceutical manufacturers, wholesalers, and multi-unit retailers. Each year the senior class visits a local wholesaler. The wholesaling establishments visited are selected on the basis of their having introduced automation and data-processing equipment to their operations. The students can thus view the latest technological improvements in this particular sector of the business. The management group at the wholesale plant is asked to stress to the students the careers that are open to them in wholesaling. The trip serves a general purpose. The students who desire to practice as retail pharmacists are given a valuable insight into the problems that are inherent in modern wholesale operation. The entire class derives a benefit from a trip

*Presented to the Section of Teachers of Pharmacy Administration, AACP, New York City, 1957.

of this type, although it might have been planned for the few who are seeking careers in administrative positions.

Trips are also made each year to pharmaceutical manufacturing firms. In the past, these trips have been designed to acquaint the students with the scientific end of the business. The trip now includes a closer look at the administrative operations, in sales, in advertising, and in market research. If it is not possible, as well it might be, to see this as an actual undertaking, the executives of the firm responsible for the various functions can give brief talks on the possibilities for pharmacists in these areas.

Trips can also be made to multi-unit retail operations. This one area is still being explored, however. If it is not possible to view multi-unit operations at close hand, it is very likely that chain store executives can be called on to address the students at the school.

A planned schedule of field trips, together with talks by industry executives, can aid immeasurably in developing a co-ordinated program.

The functions of market research, sales management, and advertising, in which our students have been successful in obtaining positions, lend themselves to a presentation by individuals in each particular field. At our school, one hour a week, called the "Dean's Hour," is set aside for visiting speakers. Talks are presented by men influential in the field of their specialization. The "Dean's Hour" is part of the senior curriculum. It is here, in a more intimate group, that we can broaden the scope of the administration programs.

Several directors of market research and development are invited to speak on the use, importance, and development of market research. Together with this, there is emphasized the part that pharmaceutically trained individuals can play in this function.

A number of sales managers from the various drug houses attend, presenting the numerous aspects and intricacies of selling pharmaceutical products. These managers often combine such talks with actual interview sessions. Interested students are screened as potential detail men. This point will be discussed later in greater detail.

It is apparent from the interest shown by the advertising firms that there is a potential employment market for pharmacists in this field. In the last several years a group of seven or eight seniors have attended the annual Pharmaceutical Advertisers Club Seminars. The advertiser's interest is further reflected in the fact that each year one faculty member and one student are invited from each of the schools of pharmacy in this area. Two years ago when I informed the club that seven seniors were interested in attending, all seven were invited. Many prospects can be explored by both the advertising firms and the students at a seminar of this kind.

Still another area that seems to offer opportunities is that of journalism. There are many pharmaceutical magazines and publications which can use pharmaceutically trained personnel in their operations. Along with this phase there is always a demand for individuals who can write technical articles and papers. They are looked for in industry and in advertising. This appears to be an excellent field for any student with an aptitude for writing. Again, the teacher's guidance is essential in bringing to the surface the need and the desire for such employment. Men in this particular

field are making an effort to bring the need to the attention of the student by attending the schools and exposing the students to it.

A speaker who attended one of the meetings was instrumental in creating an interest in the field of patent law. Several of our students are presently matriculated in law school, devoting their efforts to this line of endeavor.

The integration of all the foregoing activities depends on the teacher. Much of this program may not seem coherent to the student. One or two lectures devoted to this end, with the added interest and knowledge of the workings of the field of pharmacy administration, can resolve the decision in the minds of those who seek such a career. It will also open the door to inquiry by the students.

As teachers of pharmacy administration, we can best present the possibilities that teaching courses in marketing, management, economics, accounting and law afford. The demand for teachers in this area is great. The problem is, essentially, making the potential market supply aware of the demand.

Proper guidance is very important. After having made the pharmacy students aware of the many facets of the pharmaceutical industry, a second major step is necessary.

Those students who show a sincere interest must be carefully interviewed so that they and you will clearly understand which part of the picture they wish to become. It is meaningless to develop this program without accepting the fact that entry into the field of administration is greatly enhanced by a postgraduate education in business administration. The present pharmacy curriculum does present a much broader view, yet it is not sufficient background for managerial responsibility on the wholesaling or manufacturing level. A master's degree in business administration added to the undergraduate pharmacy training is an excellent combination.

It is now essential to aid the student in entering the particular field he has chosen, either through personal contacts, or through advice as to how to proceed. Along with this, it is necessary also to outline a graduate program that will tie in with the particular field the student has chosen.

There are certain areas of the pharmaceutical business that lend themselves to part-time employment either during the school year or during the summer months. One of our students has been so employed by a wholesaler. He intends to go to graduate school when he completes his pharmaceutical training this June. Twenty-two of our students are employed by a major pharmaceutical market research company. Several have expressed the desire to continue in this field when they have completed their schooling in pharmacy. Our school is conducting the Abbott prescription survey. Nine of our seniors are getting an insight into the methods of data collection for purposes of measuring and developing the market for pharmaceuticals.

Several pharmaceutical firms conduct a summer training program for detail men. This, too, can be utilized for acquainting interested students with the actual work involved.

Term papers afford a means of stimulating interest in pharmacy administration. A valuable introduction to statistical method is to assign papers in trend and cycle analysis of sales, market expectancy of new drugs, and

comparison of a particular store's prescription pricing method with all of the prescribed methods. To facilitate the accumulation of necessary data, the paper can be assigned so that the student can conduct his research during the summer recess. In this way, more time can be devoted to the project.

Those students who are employed in jobs such as wholesaling can be assigned papers that will enlarge their knowledge of operations. Another approach is to assign students who work in retail stores a cost analysis problem. This adds to their knowledge of both retail pharmacy operations and accounting techniques. On a broader base this, in principle, is essentially the same as that of industry.

Along with the means taken to formulate plans for student stimulation in a program such as this, there must also be a searching out of the numerous sectors of pharmaceutical manufacture and distribution that can use pharmacists in administrative functions. This is a very promising but difficult task. In detailing, for instance, there is a wide range of reactions. Some companies are anxious to have their sales force attend graduate school, and are willing to pay part, or all, of their tuition. The men who do receive their master's degree in business administration are rewarded by promotion to district or division managers. Some companies express no policy for or against such formal education. Some companies foolishly will prevent their sales force from pursuing graduate work. It is thought that this will detract from their company work. This is narrow sightedness!

In many cases, company policy, formulated by top management that is favorable to this program, is not implemented at the lower levels. It is hoped that as the pharmaceutical industry continues to grow, the men in high places will all make positive plans for incorporating pharmacists schooled in business administration into their organizations.

In the everyday pattern of teaching, many contacts are made with all the sectors of the industry. The teacher, by personal investigation or by leaving himself open to advice and suggestion, can make great contributions to this program. He can present a sound course of action, based upon knowledge of the field. Stimulating interest in the student is not enough. Questions are asked that need to be answered, or the entire work of the program is meaningless. The student who has made up his mind to enter the industry and pursue graduate work will want concrete answers. The teacher must incorporate this knowledge into the framework of program development. It is not difficult to do. Academic status opens many doors that are otherwise closed.

Business men who show an interest in hiring pharmacists should be encouraged to visit the school and to interview students. There are numerous pharmaceutical companies that do this at the present time. Others could be induced to do the same. Many companies are not aware of the rapidly growing desire of pharmacists to enter fields other than retailing. Many schools have guidance sections where the industry representative can meet with students and discuss prospects that industry offers. Or, the teacher can arrange for such meetings to occur. I have been contacted on numerous occasions by company executives who wish to visit the school for this purpose. Any effort expended to crystallize the situation is greatly appreciated by both parties.

Follow up those students who go into administrative work and graduate study so that you may measure the effectiveness of the program and open still further avenues to the expanding program. Once the students get into industry they can better relate their schooling to the actual work they are doing. This information can help to reformulate the advice given as to what graduate subject matter best suits certain types of work.

The students who enter industry can channel a great deal of information back to the teacher. Some of this is very important. They can give advice, correct methodology, and point out from practical experience the possibilities for others. Once they are engaged in administrative pursuits they can make many contacts which prove very useful. Also, the success and acceptability of these individuals will reflect on the character of the individuals you are sending into the field and will result in requests by industry for more of the same. This is an ever-growing aspect of today's and tomorrow's market. We have only begun to explore the possibilities.

One of the most significant occurrences has been the inquiries of graduates of five and ten years ago. Two pharmacists, presently engaged in retailing, have requested information on matriculation in graduate schools of business and entry into industry. Seven alumni presently employed in several different sectors of industry have made the same inquiries. Approximately 10 per cent of our graduating class have been employed by industry and matriculated in graduate school in the last three years.

The willingness of the pharmacists to follow the course herein described, some without any formal orientation, is very encouraging. It is certainly indicative that the trend will continue, and with it a constant improvement and readjustment of the program intended to foster interest in a very important function, pharmaceutical administration.

In spite of our great educational advances in the last two decades, there is much wrong with pharmacy, and I am not so sure that at least some of the fault does not lie directly at the doorstep of pharmaceutical education.

Linwood F. Tice, Am. J. Pharm. Ed., 19, 795 (1955)

THE CASE METHOD AS A TOOL IN TEACHING PHARMACY MANAGEMENT*

FLOYD A. GROLLE

The case method of instruction has long been used in law and is not new in the teaching of business. For more than thirty years it has been one of the major distinguishing characteristics of the educational program at the Harvard Business School. Some of the pioneers in our field of pharmacy administration have for a number of years been using case material to a limited extent in their teaching. From my own experience as a business student and as a teacher in pharmacy administration, I feel it is the most valuable tool we have at our disposal to prepare students to meet the challenges of tomorrow's business problems.

We want to provide our students with a background so that when faced with the closeups of managerial relationships they will not see them in a distorted focus, but can view them in the wide "vistavision" of a seasoned businessman. We should develop this background also to enable them to read order into the inescapably baffling confusion of their own experience. Their own experience no doubt will be a tangled, haphazard thing. If they have a substantial background, they will be able to bring some orderliness out of the confusion and will also be able to see interrelationships in the apparent inconsistency of actuality. We hope they will stand composed in the midst of complexity.

It is difficult to develop skill in the orderly objective analysis of business relations, because analyses in this field are too intuitive to be reduced to rules or taught only by direct instruction. Skill comes from repeated and guided exposure to experiences which cause the student to think systematically and penetratingly about the typical problems of this field. The students must somehow be rended sensitive and speculative as to the intangible elements of experience. The human elements are not merely confused but elusive. The mind not trained in looking for them during its academic life tends to overlook them altogether.

This is particularly true of pharmacy students and other technically trained persons. Throughout their professional training they have had their attention directed primarily to formulated aspects of their work. Students tend to view things in terms of formulas and positive relationships while overlooking the intangibles.

It is of paramount importance, I feel, to distinguish carefully between what should be taught in classes and what should be left to be acquired on the job after graduation. In the early days of pharmacy administration, as well as today, many teachers did not make this distinction carefully. They were carried away by the desire to be "practical." Consequently, they wasted much of their students' time by teaching them things which they would later learn anyway. During recent years there has developed a clearer appreciation of the importance of concentrating in college courses upon the aspects of pharmacy management which cannot be readily and quickly learned through experience.

*Presented to the Section of Teachers of Pharmacy Administration, AACP, New York City, 1957.

One of the principal purposes of all education must be to teach students to think, which means to give them an appreciation of the importance of making a conscientious effort to study the several sides to every question. This is doubly true in a rapidly changing world in which no teacher can forecast the specific problems which will confront his students five, ten, or twenty years from now. If we think only in the present, our teaching is already in the past. We must try to cultivate those talents which will enable pharmacists to solve problems not existing today. Merely listening to sound advice and wise statements does little for the mind unless the student's dynamic cooperation is achieved.

A case is a record of an actual business situation which has been faced by men in practice with the facts, prejudices, and opinions upon which managerial decisions had to depend. Skill in management must be obtained, I believe, largely through experience. Thinking about a specific case, and discussing it in class and informal discussion groups, can help to provide such experience. The student preparing to discuss a case in class is required to *do* something—to weigh various factors, to make some calculations, to analyze a problem, to take a position, and so on. He must explain his point of view, defend it, understand and appraise the arguments of his fellow students, and decide what arguments are the strongest. This develops his power to think. Many of our pharmacy students have become habituated to the role of the receiver. The time comes when these young pharmacists must act on their own responsibility. The job of pharmacy administration courses, consequently, must be aimed at developing in students those qualities of understanding, judgment, and communication leading to wise decisions.

The prime virtue of the case method is that it is capable of inspiring activity on the part of the students under somewhat realistic conditions. It removes them from the role of passive absorbers and makes them partners in the process of learning. In the case method all members of the academic group—teachers as well as students—possess the same basic material from which they must make their analysis and decisions. Usually there is no single correct or incorrect solution to a business problem. In business one cannot peek for an answer in the back of the book. In many cases there is always a good possibility that the best solutions have not been found—not *even* by the teacher!

This method instills into the student the habit of making decisions. In actual practice, the decision to do nothing may be as important as the decision to act. The lecture method for the most part does not have action as its goal but seeks to implant knowledge or instill appreciation. A student using the case method must be able to learn techniques of reasoned action. Each business situation is likely to be new and to require imaginative understanding preliminary to sound judgment and action.

The student must be able to match wits with his equals and contemporaries. The art of exchange of ideas is cultivated. This provides a means of learning from others and also gives experience in the effective transmission of one's ideas. Not all students can bear the strain of thinking and making independent judgments which are vigorously challenged by their classmates. Many prefer to have answers handed to them on the proverbial "platter."

To the teacher every class period is a new problem and another opportunity, not only to learn but to help others to learn. For the teacher, as well as the students, the case method is a severe discipline.

Today the most commonly used method of teaching pharmacy management is the lecture in conjunction with text assignments. There are certain advantages in this method which are responsible for its wide prevalence in pharmacy teaching. It is commonly thought to be efficient; and it is economical of the time, energy, and patience of the teacher as well as of the student. In addition, it may appear to produce satisfactory results. But we know when we examine the effectiveness of the lecture method by more than superficial tests, the content of the lecture has not made nearly the impression that we think it has.

The type of material presented in pharmacy management courses lends itself to a combination of lecture and case method. Pharmacy management can and should be taught using cases in combination with the lecture method. During the first part of a two-semester sequence, while the students have little knowledge concerning the terminology of the areas involved, approximately half of the time could well be spent using some type of lecture procedure. The other half could be used for analysis of actual cases that have confronted pharmacists in the field. During the second semester the greater portion of the class time should be devoted to the analysis of cases.

Many teachers in this area have expressed interest in using cases, but at the present time very little material is available. During the last year I have been ferreting out and assembling case material from pharmacies throughout the United States. This material is being tested in our pharmacy management course and will be published in a form suitable for classroom use. This project is only a "priming of the pump." In the future, we teachers in the area should each develop one or two new cases a year and, as a result, continuously provide new cases available for teaching purposes. I feel the case method carefully coordinated with lectures will become the accepted tool in the future of pharmacy management.

How many of us will go out and speak late at night, which is the only time that we can be heard by retail pharmacists? How many of us will work for good pharmaceutical legislation and see to it that Boards of Pharmacy are not mismanaged by self-seeking politicians?

Linwood F. Tice, Am. J. Pharm. Ed., 19, 796 (1955)

TEACHING IN THE PHARMACY ADMINISTRATION LABORATORY*

JOHN A. LYNCH

With the more exacting demands on the pharmacy student's time, due to the enlargement and improvement of the courses required, and the addition of such courses as physical pharmacy, pharmacy medicinals, pharmacology, and biochemistry, it has become increasingly difficult for the average student to work during his college course. In addition, the various State Boards of Pharmacy have set up new requirements:

1. No credit is to be given for any time served in retail pharmacy prior to matriculation in a school of pharmacy.
2. Most states will give credit only for time earned in summers between school terms.
3. In some states an apprenticeship must be served after graduation to earn credit for practical experience.

In former years much of the practical knowledge of pharmacy was acquired by working in retail pharmacies while attending college. The proprietors, or preceptors, taught the students the practical application of the theory they were learning. The students saw actual business methods and customs in daily use. Experience was gained in many varied phases of management.

Today, however, most of the students are approaching graduation before they can obtain practical experience. But their employers expect them to bring some experience to their jobs. Therefore much of the practical knowledge must be acquired in the pharmacy administration laboratory.

Our senior class numbers between eighty and ninety students each year. For assignment in the pharmacy administration laboratory we divide the class into groups of six students each for four three-hour periods, giving each student a total of twelve hours in the laboratory. Of these six students, each one is assigned to a specific duty—one as manager, two to the prescription department, two to the front of the store, and one to the stockroom. Each hour the manager rotates the students from one location to another.

During the first period the manager is selected by his group, and he, in turn, assigns the remaining five to the various locations. The whole period is then used to allow the student to become familiar with the store layout, the merchandise in each department and its location. At the end of the period each student has been in the three departments of the store. He will have learned that the sections in the front are numbered from one to twenty-two and the shelves lettered a, b, c, etc. For example—*Listerine* would be found in Section 7, shelf c. The prescription department sections are lettered A to Z, the shelves numbered 1, 2, 3, etc. *Equanil* tablets would be located in Section H, shelf 4. The entire store is alphabetically indexed according to this plan. The student can recognize immediately from the index whether the item is "over the counter" (o.t.c.) or prescription (Rx). In the stockroom the student learns arrangement and stock control. At the end of this three-hour period the manager is required to submit a typewritten report on all procedures covered.

*Presented to the Section of Teachers of Pharmacy Administration, AACP, New York City, 1957.

During the second laboratory period the students assigned to the front of the store check stock and prices, making any necessary changes. They also set up new top-of-counter and island displays and retrim floor cases. The two students in the prescription department receive prescriptions over the counter and by telephone. They fill, price, and file them. Ophthalmic prescriptions are filled in a sterile ophthalmic section in the prescription department. The student in the stockroom unpacks orders, places the merchandise on the proper shelves, and fills customers' orders. The manager again supervises all departments, rotating the students each hour, and submits a report at the close of the period.

The first hour of the third period is spent in taking physical inventory with two students in the front, two in the prescription department, and one in the stockroom. The other two hours are used by the instructor to demonstrate selling techniques of prescription accessories—for example—showing customers how to read a clinical thermometer, giving practical information for sales of vaporizers, atomizers, hypodermic syringes and needles, rubber accessories, etc. The operation of the cash registers is explained at this time. The students also are shown the proper method of wrapping prescriptions and other drugstore merchandise.

The fourth period is devoted to the actual operation of a retail pharmacy. Laboratory assistants pose as customers, actual sales are made, and the students graded on counter technique. Prescriptions are received by phone as well as over the counter, and requests for information on new drugs and preparations are received by phone and person. This information is readily available at an information desk complete with phone and two shelves, one carrying manufacturers' catalogs and the other a complete pharmaceutical reference library. Above is a display of new items, and in the file drawer, in alphabetical order, are stored all new product information pamphlets made available to the pharmacist by the manufacturer. The conversations are recorded on a tape recorder, and these are later played back and discussed in pharmacy administration lectures. Medical representatives and wholesale salesmen also stop in and give a sample detail visit and check stock. Poison and exempt narcotic sales are made and sales recorded in the proper books at the waiting counter. At the end of this period the manager is responsible for furnishing a complete record of the business transactions of the day.

Two senior students are assigned weekly to install professional or merchandising displays in the store windows. The displays have been designed by them in their junior year as part of the course in display. The windows are then photographed, and prints and slides are made of them for future instruction.

As a medium of instruction the pharmacy administration laboratory can be used effectively in almost any phase of the curriculum's requirements, but it lends itself especially to the effective teaching of drugstore management.

Pharmacy has been given a new opportunity. Let it not be said at a later time that we let it slip because we were not adequate to the task.

Arthur H. Uhl, Am. J. Pharm. Ed., 12, 332 (1948)

THE USE OF INDIVIDUAL STUDENT FIELD PROJECTS IN TEACHING PHARMACY ADMINISTRATION*

S. B. JEFFRIES

BACKGROUND OF THE PROBLEM

Traditional patterns of retail marketing and distribution are undergoing rapid and comprehensive changes in practically all fields of retailing. In the food field, the "revolution in retailing" has found expression in the tremendous growth of self-service supermarkets. Department stores are suburbanizing their operations to meet problems of shifting population and changing consumer shopping patterns. Other evidences of the retailing revolution can be seen in the rapid expansion of house-to-house distribution and the revitalization of mail order selling and retail store operations. The "discount" house particularly is a product of this era of rapid change in retail distribution.

As a result of this revolution, traditional retailers in these and other fields, including chain and independent drugstores, have lost volume to those merchants who have recognized and adapted themselves to the changes which have taken place.

Among the more important economic factors which have brought about this retailing revolution are:

1. Increased cost of labor
2. Higher operational costs of all kinds
3. Increased and intensified competition

These three factors, plus the radical changes in consumer buying habits, shopping preferences, and attitudes, have resulted in a constant lowering of net profits, and, of equal significance, a serious lag in the growth rate of total dollar volume for many independent and chain drugstore organizations.

The job at hand then is to find the ways and means of increasing the growth rate as well as the total dollar volume and profits while holding in check, in fact, even reducing, operating costs.

It is no secret that, in the past, drugstore competition was not well organized, *nor as extensive as it is today.* And most drugstores could not see any real reason or necessity for indulging in any of the modern and progressive changes in physical structure and organization of the drugstore. This same resistance to change held true (and still does to a large extent) on follow-through matters dealing with merchandising and sales promotion.

Today, drugstore competition is organized. It is aggressive, forceful, and hungry for the "fatter" gross margin dollars offered by traditional drugstore items. *Even the sacrosanct prescription department* with its better-than-average gross margin and net profit opportunities is now fair prey to the wide-awake, nondrug, mass-volume retail operator.

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*Presented to the Section of Teachers of Pharmacy Administration, AACP, New York City, 1957.

The fact is that the drugstore's prior rights and exclusive claims to consumer patronage have been breached by nondrug competitors to the extent, presently, of roughly $580,000,000 per year, with the end nowhere in sight.

In developing criteria for more effective drugstore layout and planning, it is essential that we understand and appreciate the importance of today's consumer buying habits, preferences, and attitudes, and their relationship to store facilities, product merchandising, and promotion.

The recently published study of the shopping habits and preferences of 2,487 supermarket customers who shopped and/or made purchases of drug toiletry products in supers pointed up what might be called the most important competitive weakness of the traditional drugstore: the failure to provide today's free-wheeling, open-minded consumer with the fundamental conveniences in shopping he wants and insists upon in exchange for his patronage. His frank attitude about the things he likes and dislikes about the drugstore and the more affirmative reasons why he prefers to purchase his drugs and toiletries in the *nondrug* outlets are most helpful in pinpointing our problem.

Fundamentally people are demanding that shopping be made *easy and convenient* for them, and they favor those outlets that offer them the most "conveniences in shopping."

To Mr. and Mrs. Consumer "conveniences in shopping" appears to mean:

1. Departmentalized displays of merchandise that make products easy to find and purchase.
2. Timely and suggestive displays.
3. Attractive, open, accessible, mass displays of popular, fast-moving brands on gondolas, tables, eye-level wall shelving with prices showing.
4. Window displays that catch the eye, tell the story, and remind the consumer of a need.
5. Aisles and space enough to permit free movement around the store and opportunity to shop the displays without being jostled and bumped.
6. Helpful buying assistance from store personnel when needed, but without "pressure."
7. Spotlessly clean, well-marked, orderly, and modern prescription departments attended by uniformed pharmacists who are friendly, sympathetic, and helpful.
8. Displays spotlighting "familiar" brands that spell confidence and reliability.
9. Well-lighted displays in brightly lit and attractively decorated store.
10. Parking facilities for shopping.
11. Fast efficient service once items have been selected.

If, as this and other consumer-retail distribution studies indicate, these are the shopping conveniences that customers prefer and insist upon, that successfully build dollar volume and profits, that attract more customers,

that get them moving in and around the merchandise, and that help the retailer "squeeze" every possible dollar out of each customer visit, they most certainly provide the framework within which the layout and arrangement of facilities must be accomplished. It follows also that any evaluation of present facilities must be done within this same framework.

The merchant must reevaluate the character and extent of the competitive "conveniences in shopping" he is making available. And following such a candid self-appraisal, he must think of the ways and means of making available, in whatever form, and to whatever extent possible, as many of these conveniences as are likely to keep Mr. and Mrs. Consumer buying more of their health and beauty needs in his drugstore.

EVALUATION OF STORE LAYOUT AND MERCHANDISING FACILITIES ARRANGEMENTS

1. To sum up, the fundamental objective of effective store layout and merchandising planning is to achieve the highest volume of sales per square foot at the lowest investment and selling cost per sales dollar. This is approached by the application of drugstore planning including:

a) Maximum utilization of all available space.

b) Avoidance of dead areas and waste space.

c) Departmentalizing merchandise with an allocation of space based on departmental volume and profit potentials, turnover of merchandise, size of average sales, displayability of goods, contribution of the department to the sales of other departments.

d) Payroll control-planning layout for proper clerk coverage within payroll limitations, i.e., keeping selling and maintenance costs down.

e) Controlled customer circulation and traffic flow—proper placement of merchandise departments, fixtures, types of fixtures, and aisles in order to:

   i. Obtain greatest possible customer exposure to goods on display.

   ii. Take advantage of known cutomer shopping habits, buying patterns and attitudes, etc., i.e., the tendency to turn right upon entering the store, to walk around the perimeter of the store, to be drawn towards brightly lit areas and displays, etc.

f) Conforming store layout and merchandise arrangements as much as possible to customers' concepts of shopping conveniences enumerated earlier.

2. Keeping in mind the over-all background of the problem and the general principles of store layout and planning involved, the student will, in this store evaluation problem, deal realistically with the practical problems of the drugstore operator who feels, for one reason or another, that the way his store is set up, he is:

a) Not realizing maximum sales and profits per square foot.

b) Burdened with above-average selling costs, and

c) That his capital investment in fixtures and equipment is somewhat out of line with sales (either too high or too low, as the case may be).

3. In effect, the student will, for the purpose of this store evaluation

project, assume the role of a retail management consultant. His job will be a twofold one: first, he will gather and enumerate all of the data pertinent to the drugstore layout and merchandising facilities arrangements—including a customer traffic-flow analysis. Second, in the light of the problem's background and the layout principles mentioned, he will prepare a critique on the facts together with his conclusions and suggestions for improving the over-all operation.

MODUS OPERANDI FOR HANDLING THE PROJECT

1. The student will have assigned to him an operating drugstore in Greater New York City. Provision for student-management liaison on the problem will be made beforehand to assure the utmost cooperation by management.

2. Having made contact with the store manager (or owner) the student is required:

a) To fill out the attached questionnaire sheets.

b) Draw, on the special graph paper worksheet supplied, a scale plan drawing of the present store showing: walls, doors, windows, important structural characteristics (poles, etc., on floor), all present selling and storage fixtures, fountain and booths, if any, and storage-room facilities on the store or street level. Accurate measurements of all fixtures, aisle space, and structural elements must be taken so that they can be shown on the drawing to proper scale. Each square may represent a fraction or multiple of a foot so as to get the largest possible drawing on the worksheet, centered, allowing for adequate margins for legends and other pertinent information. The measurement scale, together with other pertinent information, should be noted in a legend box placed on the left-hand bottom of the worksheet. The student is directed to give special attention to the prescription department layout and fixtures.

c) For purposes of uniformity, use the symbols shown in the Johnson and Johnson modernization and layout schedule of furniture, fixtures, and equipment to identify the fixtures used in your drugstore layout (2).

d) Keep the diagram as simple as possible.

e) Refrain from asking the owner for data which he may regard as confidential.

f) Draw neatly upon the completed layout worksheet, the traffic flow pattern of at least forty customers. Each continuous flow line is to represent a single customer's visit to the store, tracing the flow path through the store. It should show by occasional arrows the direction of the customer's path, and by a heavy dot on the flow line what departments and/or fixtures were visited (i.e., stops to shop or buy) on the trip through the store.

3. It is suggested that no less than three visits should be made to the store for the purpose of completing the traffic flow study. It is also suggested that the student arrange his visits so that he will come to the store during one low, medium, and high traffic load period. Traffic load information can be obtained from the store manager or owner.

4. To distinguish between the customer flow patterns noted during each of the visits, the students should use: solid black lines for the flow patterns noted on the first visit, red for the second set of patterns, green for the third set, and blue for the fourth. The student should note in the legend box, not only the number of visits and the color of the flow pattern it represents, but also the time of day, the day of the week, and its designation as low, medium, or high traffic-load period.

5. Great care should be exercised in observing and entering the customer's flow pattern on the worksheet. Mistakes or advantages in the location and/or display set-up of departments, fixtures and merchandise, the strengths or weaknesses of the various types, and kinds of display and display fixtures and their relative pulling power, in addition to many other customer shopping habits and attitudes will show up graphically and dramatically.

6. If the customer flow lines threaten to become unintelligible, obtain a sheet or two of tracing paper to accommodate the flow patterns of the second or third visit.

7. The student must have entered on the back of the questionnaire the signature or initials of the manager or owner representing each visit to the store along with the date.

9. Prepare on 8½ x 11, white bond paper, typed double-spaced, a critique of the drugstore operation observed and surveyed, using as an outline and for points of reference the list of layout principles enumerated earlier together with the twelve "Conveniences-in-shopping" referred to in the consumer shopping habit study (1). In addition, the student should submit on a separate 8½ x 11 sheet a very simple layout showing or illustrating suggested changes in layout and the basis for his critique.

10. In filling in the "Product Location and Display Analysis Sheet" (Information Item No. 11), the student will limit himself to an analysis of only the leading popular, *nationally advertised* brand name products within each of the commodity groups indicated, i.e., proprietary products of such representative companies as: National Brands Division of Sterling Drug Co., Bristol-Myers, E. R. Squibb, Whitehall, McKesson-Robbins, Anahist Co., Pharmaceuticals, Inc., Norwich, P-D, Ex-Lax, Vick Chemical, Chesbrough, Dr. Scholls, West, Miles Laboratories, Johnson and Johnson, Warner-Lambert, Upjohn, Plough, Purepac, Winthrop-Stearns, Carter, etc.

A display of items may consist of any number of similar or different brands of items making an *identifiable* commodity group from the *customer's point of view*. Example: Six pieces of Bayer aspirin (100's) on the sales counter or on a shelf, identifiable as such, or six pieces made up of three different brands of headache remedies may be such a display. Use judgment in determining an identifiable group. A display may also be a manufacturer's carton of a half-dozen items placed on the counter.

Items making up any commodity group may, even in a departmentalized drugstore, be located in one or more areas of the drugstore, and displayed therein on one or more *different* fixtures, or in different ways. To determine the display pattern of each "location" group, assign a number to each individual product or group location, and using this identifying number, show how it is displayed by entering the identifying number in the proper box describing the display.

INFORMATION NEEDED FOR EVALUATION OF DRUGSTORE LAYOUT AND MERCHANDISING FACILITIES ARRANGEMENTS

Date..... Firm Name.....

Proprietor's Name .....

Street Address..... City..... State.....

Store

1. **Location:** .....Downtown .....Neighborhood .....Suburban
   Site .....Corner .....Middle of Block .....Other.....
   (Explain)

2. **Type of Business:**

Average neighborhood traffic	.....
High traffic	.....
Merchandising store	.....
Shopping center	.....
Established	.....
New	.....

3. **Employees:**

Number of regular sales employees	.....
Number of registered pharmacists	.....
Number of fountain employees	.....
Number of part-time employees	.....
Others (explain)	.....

4. **How many Registers Are in Use at Present?**
   (Indicate the location of registers on layout work sheets.)

5. **Annual Sales Volume**

Classification	Average Number of Rx's per Day						
	1 - 5	6 - 10	11 - 20	21 - 30	31 - 40	41 - 80	81+
Under $50,000							
$50,000 - $75,000							
$75,001 - $100,000							
$100,001 - $150,000							
$150,001 - $200,000							
$200,001 - $250,000							
$250,001 - $300,000							
$300,001 - $400,000							
$400,001 - and over							

6. **Customer Service:**

Self-service (except Rx dept)	.....
Semiself-service	.....
Post office	.....
Phone booths (state number)	.....
Notary public	.....
Bd. of Health station	.....
Charge accounts	.....
Delivery	.....
Parking	.....
Others (explain)	.....
	.....

7. **Prescription Department:**
   Type: .....Open .....Semi-open .....Closed or concealed
   Location: .....Front .....Middle .....Rear
   Level: .....Floor level .....Raised (If raised: elevation in inches.....)

Fixtures	Description and Use
Main Rx fixtures	
Display shelvage	
Display cases	
Rx sales counter	
Rx work counter	
Refrigerator	

Rx Storage and Inventory Facilities:
- Schwartz cabinets .....
- Open shelving .....
- Space savers .....
- Others .....
- .....

(Show the location of Rx storage facilities on layout work sheet.)

Rx Storage Arrangement:
- Alphabetically .....
- By company name .....
- By drug classification .....
- Other (describe)

Location of sink for use in Rx operation .....

8. Fountain Department:
- Length .....
- Number of stools .....
- Number of booths .....
- Number of tables .....
- Is there heavy fountain traffic? .....
- If an important operation, explain:

Type of System:
- Pay-when-served .....
- Pay cashier .....

9. Departmental Breakdown:

Department	Location[1] F	M	R	RS	LS	CS	Square Ft. Floor Space	% of Total Store Sq. Ft.	Service[2] S	SS	SL	Dept[3] Ident
Prescription												
Rx accessories[4]												
Proprietories:												
Laxatives												
Cough & Cold												
Antacids												
Dry packs												
Pain relievers												
Oral hygiene												
Foot products												
First aid												
Vitamins & tonics												
Others:												
Veterinary products												
Feminine hygiene												
Household supplies												
Fountain												
Tobacco												
Sundries												
Baby goods												
Confectionary												
Photography												
Toiletries & cosmetics												
Cosmetics												
Hair care products												
Shaving products												
Dentifrices												
Hand products												
Others												
Unclassified												

Notes: 1. F— front third of store; M— middle third; R— rear third; RS— right side; LS— left side; CS— center of store area.
2. S— service; SS— semi-service; SL— self-service.
3. Card signs, illuminated signs, symbols, etc.
4. Surgical elastic goods, rubber goods, heating pads, vaporizers, thermometers, white enamel ware, etc.

10. Schedule of Furniture, Fixtures and Equipment

Equipment	Description	Location[1]	Use[2]
Prescription dept.			
Rx sales counter			
Rx display case (lowboy)			
Rx wall case			
Rx work counter			
Combination Rx front (unit & work counter)			
Rx storage units			
Others			
Sales counter(s)			
Service wall case (open)			
Service wall case (glass enclosed)			
Self-service wall case			
Gondola or two-sided floor displayer			
One-sided floor displayer			
Display tables			
Manufacturer's displayer			
Cosmetic show case			
Soda fountain unit			
Stock room facilities:			
Shelvage			
Tables			
Other			
Other			

Notes: 1. As to departments 2. Display, storage, etc.

11. Product Location and Display Analysis Sheet

LOCATION OF PRODUCT (GROUP) DISPAY ANALYSIS

ITEMS (GROUP)	Front	Middle	Rear	Right side	Left side	Center/store	Sales counter	Serv. W/C open	Ser. W/C enc.	Self/S W/C	Gond. 2 side/F	Mfg. disp. U.	Cos. Sho/C	Counter St/D	Identifiable	Dept./Sub./D.	Signs Prom/M	Mass. disp.	Window disp.	Multi-unit D.	Peg board D.	Full serv.	Semi serv.	Self serv.	Glass tray D.	Rx dept./R	Rx dept./M	Rx dept./F	Rx disp./fixt.
ANTACIDS																													
ALKALIZERS																													
ANTIHISTAMINS																													
COLD CAP TAB.																													
COUGH SYRUPS																													
CHEST RUBS																													
INHALERS																													
LINIMENTS																													
RUBBING ALC.																													
BURN REM.																													
HEADACHE REM.																													
FIRST AID																													
ORAL HYGIENE																													
VITAMINS																													
TONICS																													
LAXATIVES																													
THROAT LOZ.																													
DISINFECTANTS																													
DRY PACK DRGS																													
WET PACK DRGS																													
FOOT REMEDIES																													
EXT. OINT.																													
MED. POWDERS																													
EYE-EAR PREPS																													

ANALYSIS OF BRANDS BY COMMODITY GROUPS

Commodity Group	*Brands*				
ANTACIDS					
ALKALIZERS					
ANTIHISTAMINS					
COLD CAP. TAB.					
COUGH REM.					
CHEST RUBS					
INHALERS					
LINIMENTS					
RUBBING ALC.					
BURN REM.					
HEADACHE REM.					
FIRST AID					
ORAL HYGIENE					
VITAMINS					
TONICS					
LAXATIVES					
THROAT LOZENGES					
DISINFECTANTS					
DRY PACK DRGS.					
WET PACK DRGS.					
FOOT REMEDIES					
EXT. OINTMENTS					
MED. POWDERS					
EYE-EAR PREPS.					

NAME RESEARCHER..... STORE NAME ADDRESS.....

REFERENCES

1. "Bulletin Number Five," Pharmaceutical Management Research Associates, New York, New York, 1956.
2. "Stop, Look and Listen; Modernization and Layout Kit," Johnson and Johnson Company, New Brunswick, New Jersey, 1956.

Pharmacists must demand for pharmaceutical education such financial support that will permit of proper growth and development and which is consistent with the merits and needs of the profession of pharmacy in the state.

Bernard V. Christensen, Am. J. Pharm. Ed., 14, 327 (1950)

PHARMACY ADMINISTRATION--A MEANS FOR PROFESSIONAL SURVIVAL*

ROBERT E. ABRAMS

The title selected for this presentation may appear to be boastful and just another opportunity for a pedant to extol the tremendous importance of his teaching efforts. I can assure you, this is not the case. Actually, I am probably least qualified to even occupy a place on your program, since most of my contacts with pharmacy administration to date have been to offer a lecture a week in a course we call, for want of a better name, professional pharmacy. This primarily entails discussions of sickroom supplies; such as, thermometers, hypodermic syringes, atomizers, nebulizers, and items of a similar nature, as well as discussions on individual management problems in conjunction with our model pharmacy. This year I have also undertaken the teaching of pharmaceutical jurisprudence. Thus, with this meager experience, I doubt that I could be classified as a full-fledged teacher of pharmacy administration.

The observations and challenges which will be presented are, therefore, not based on any broad teaching experience in the field but are based on opinions which have been culled by traveling quite widely throughout the country as Executive Secretary of the American College of Apothecaries. In this capacity I have been able to observe the practice of retail pharmacy very closely and have had intimate contact with both the physical operation and financial operation of some of the best-managed pharmacies in the country. It is from this experience that I hope to be able to present some information which will prove interesting to you as teachers of pharmacy administration.

The future of pharmacy is bright if—the pharmacist of today and the next few years is equipped to handle the challenges that will confront him. Unfortunately, it appears that too many of our practicing pharmacists are not equipped to meet these challenges, and it will be up to us to help them. The pharmacists of the country today seem to be groping in a field of indecision and are looking for something that will put them on the right path to find a way out of that field. By and large, the leadership given the pharmacist has been as indecisive and uninspiring as his own surroundings of dilemma and pharmacy seems to be drifting like a ship without a rudder.

History has shown that some of the very forces that the pharmacist had depended on to provide him with proper guidance have actually confused him. A number of years ago, he was told to put everything on a self-service basis. Now, today, in the light of certain court decisions, it is very apparent that any item having any therapeutic value should not be handled on a self-service basis and, in the best interest of public health, should always be sold by a pharmacist. There are many instances where the pharmacists have been faced with the necessity of making decisions directly affecting their professional future and, unfortunately, too many times, they found themselves lacking in the basic information to make those decisions properly.

*Presented to the Section of Teachers of Pharmacy Administration, AACP, New York City, 1957.

Pharmacy has changed in the last ten years—changed very rapidly—but retail pharmacy in the main has not been able to keep pace with the change primarily due to the very nature of retail pharmacy. It is absolutely essential for us to realize that pharmacy is not judged by our extensive manufacturing facilities, by our ultramodern wholesale operation, or our impressive cathedrals of learning. Pharmacy, as a profession, is judged by the fellow who operates that pharmacy to which the public brings their prescriptions, and, unless what they see is good and unless the professional impressions left are favorable, the professional future of pharmacy is in a precarious position.

How many times have you heard the statement, "But the pharmacist is and always has been a poor businessman"? This type of propaganda has been repeated so often that we have convinced everybody, even the pharmacist—who isn't a poor businessman—that it is so. Somewhere, somehow, someway, this philosophy has permeated our thinking and has left a mark which has not helped anyone. It has been my experience that some of the best pharmacists in the country are also very proficient businessmen, and, actually, they have become excellent pharmacists because of that business efficiency. And, to the contrary, show me a poorly run pharmacy, and I will show you a poor representative of our profession. Who are the pharmacists who attend seminars? Who purchase the latest books in pharmacy? Who make efforts to procure literature? In the main, it is those who are in a position financially to spend the time and money, and these in most cases are operators of well-managed pharmacies.

As much as we would like to dismiss the mundane thoughts of the medium of exchange from our minds, we cannot do so, and to recognize that the profitable operation of a pharmacy is essential to the professional appearance and impression of that pharmacy represents the first step toward helping to solve the problem. The words "economics" or "business" seem to be looked upon with some scorn by those in the schools who are responsible for the teaching of the so-called pure sciences. However, this interest somehow seems to change when it comes time to negotiate their personal contracts for next year's teaching assignment! We cannot shoo the economic side of retail pharmacy under the counter, and the sooner more of our educators realize this and we adopt a completely over-all professional and scientific approach to all of retail pharmacy, the business side included, the better will be our profession. Pharmacy need not and should not be a schizophrenic. There is only one consideration, and that is our professional responsibilities and motivations; but, if you reflect on some of the problems facing pharmacy today, you can well see that the root of many of them is the fact that the pharmacist has not faced his business responsibilities in a professional manner.

Let us be "practical" (another word which seems to make some spines shudder). If a pharmacist, through improper pricing, ordering, inventory control, or accounting practices, finds himself unable to pay his bills or provide his family with a decent level of living, he is going to seek ways of improving his state. Since, in most cases, his background in management techniques is most meager and, actually, he did not have the time nor the inclination to improve it, to hope that he suddenly will develop overnight into an efficient operator is just wishful thinking. In many cases, what

does he do? He looks for ways and means of cutting corners, and there are ways, as I am sure you all know. Unfortunately, most of these opportunities to cut corners arise in the prescription department and we have seen the development of certain cancerous growths of unethical practices. If pharmacy would have the courage through its boards of pharmacy to take immediate positive action where nonprofessional conduct occurs, the problem might not be as acute, but this is not the case.

Do not misinterpret my statement. I do not believe that sound training in pharmacy administration can change that individual with a weak moral fiber, but I do believe it can help create an atmosphere of professionalism which will prevent the new pharmacist from seeking other than completely ethical practices to provide the necessities of life. Remember, it is so easy to be ethical on a "full stomach."

The entire future of pharmacy depends on a healthy core of retail pharmacy, and, unless we recognize it and do something about it, the future may not be as bright as predicted. Now, pharmacy administration is not a panacea. It cannot turn failure into success, but proper course work can provide the new pharmacist with a wealth of background from which he may draw to make proper business decisions. His training will, of course, be supplemented by that which he obtains in his internship or apprenticeship experience. It is in this area where improvement is absolutely necessary. As much as we try to ignore it, it becomes more obvious. Unless some control and selection is made of the pharmacies in which students receive their internship training, then the value of such programs can frequently be defeated and, at times, they may even serve as a serious detriment to the student. No one wants to be shackled with the responsibility of making the selection, but, if we are honest and have the courage to do it, who would be better qualified to make the selection than the teacher of pharmacy administration. Our responsibilities do not end with our last lecture. The teacher of pharmacy administration has the opportunity to make an indelible impression on the student, to inspire him, to show him what can be done. You talk to him about things he sees and experiences, things which he has encountered. If you are uninspired, he will be likewise.

In my opinion, it is the responsibility of the teacher of pharmacy administration not only to provide the student with the management tools he will need but also to channel his thinking toward improving our profession. He must be made to understand not only the letter of the law but the philosophy and the implications. He must be fully acquainted with ethics, and all practices good or bad should be explained. An interest in the organization of pharmacy must be nurtured, and a desire to see and understand that which is not good and a willingness to make efforts to change it must be encouraged. It has been my experience that the teacher of pharmacy administration has a contact with the student which is not shared by others on the faculty, and to ignore the opportunity to utilize that contact for good is a gross neglect of responsibility. In reality, we can teach our students very little; all we can hope to do is inculcate in them a desire to seek out the answers themselves.

Our responsibilities, however, cannot stop with the students. The job to be done with those already in practice is tremendous, for, if we cannot im-

prove existing practices, future practices will suffer either by contact or osmosis. In discussing future curriculums, we frequently hear the statement, "Up to this time, we have just trained our students for retail pharmacy; now, we plan to offer them other avenues." I have no quarrel with offering courses to pharmacy students which will better train them to enter other aspects of pharmacy, but to say we have trained pharmacists for retail pharmacy in the past is deceiving ourselves. All one has to do is look around and see what has been wrought.

Pharmacy administration has come a long way, but it still has a long way to go. We need more teachers and we need them fast, not just teachers to present facts but teachers who are devoted and who will inspire. In our opinion, they should be pharmacists and pharmacists who have not lost contact with reality. Teachers in pharmacy administration must be more than teachers—they must take an active part in associations, in extension service work, and in legislative work, for it will be and must be that the future leaders of our profession will come from the field of pharmacy administration, and it will be the responsibility of the teachers to seek out these people and provide them with the training and understanding to do the job that is so badly needed. It is my firm conviction that pharmacy administration, while not the only means, represents one of the primary means for professional survival.

The future of pharmacy is as much our concern as that of those who practice it. In fact, it is our solemn obligation to our students to see to it that the profession will continue to be a calling of which all can be proud.

Linwood F. Tice, Am. J. Pharm. Ed., 19, 796 (1955)

REPORT OF THE SECRETARY-TREASURER OF THE AACP CONFERENCE OF TEACHERS 1956-57

The Council on Conference of Teachers, which is the governing body of the AACP Conference of Teachers, was composed of the following persons during the year 1956-57:

Representative of Biological Sciences.....G. F. Reddish
Representative of Chemistry.....Paul J. Jannke
Representative of Pharmacy.....E. E. Leuallen
Representative of Pharmacy Administration.....Ralph J. Mill
Representative of Graduate Instruction.....Ewart A. Swinyard
Representative appointed by the AACP.....Perry A. Foote

During the Detroit convention in 1956 the following were selected as officers for the current year:

Chairman—Ewart A. Swinyard (to serve one year)

Vice Chairman—E. E. Leuallen (to serve one year)

Secretary-Treasurer—Edward P. Claus (to complete second three-year term).

The membership of the Conference of Teachers includes 315 active members who have paid dues for the year ending July 31, 1957. Of these, seventeen have paid until July 31, 1958, two have paid until 1959, four have paid until 1961, and one has paid until 1966. All of the 315 members are considered to be active members in the Section of Teachers of Graduate Instruction; forty-six of these belong to two sections of choice other than that of graduate instruction, 267 belong to one other section, and two members have paid dues in all four sections.

The rearrangement of the sessions of the Council on Conference of Teachers effected during the 1956 convention has been followed for the present year. Two sessions are scheduled: the first is a luncheon meeting on Monday, immediately following the four Teachers' Sections. The second is the reorganizational meeting planned for Tuesday morning at 8 a.m.

At the luncheon meeting the chairmen of the various committees present their reports, thus facilitating the order of business for the present session of the Conference of Teachers.

Much credit is due the officers of the various sections for the splendid recruitment of new members for the Conference, particularly to Mrs. Esther Jane Wood Hall and Dr. Joseph H. Kern of the Section of Teachers of Pharmacy Administration and also to Dr. Allen I. White of the Section of Teachers of Chemistry for the increased enrollment in those two sections. I wish to express my thanks also to the other officers of the sections, to the officers of the Council, and to the Executive Committee of the AACP for their cooperation during the past year.

The AACP Executive Committee has continued to finance the office of the Conference Secretary-Treasurer. Inasmuch as the Bylaws of the Conference provide that all moneys collected for dues be placed in the individual section treasuries, no funds remain for conducting the affairs of the Secretary-Treasurer's office. The Executive Committee has seen fit to continue its allotment of $50.00 for this purpose. The Treasurer's report shows that only

$7.72 of this amount is still on hand. Thus, the AACP is again requested to allot $50.00 for the operation of this office for the year 1957-1958.

Respectfully submitted,
Edward P. Claus
Secretary-Treasurer
AACP Conference of Teachers

TREASURER'S REPORT
APRIL 23, 1957

Section of Teachers of Biological Sciences:				
Dues collected to 4/23/57—92.00	4/5—	73.60	1/5—	18.40
Brought forward from 7/31/56		243.20		
Final Balance on 4/23/57		316.80		
Section of Teachers of Chemistry:				
Dues collected to 4/23/57—88.00	4/5—	70.40	1/5—	17.60
Brought forward from 7/31/56		214.20		
Final Balance on 4/23/57		284.60		
Section of Teachers of Pharmacy				
Dues collected to 4/23/57—118.00	4/5—	94.40	1/5—	23.60
Brought forward from 7/31/56		318.28		
		412.68		
Less Bank Charge		.25		
Final Balance on 4/23/57		412.43		
Section of Teachers of Pharmacy Administration:				
Dues collected to 4/23/57—90.00	4/5—	72.00	1/5—	18.00
Brought forward from 7/31/56		102.94		
		174.94		
Less Secretary's Expense		24.16		
Final Balance on 4/23/57		150.78		
Section of Teachers of Graduate Instruction:				
Amount apportioned by other four sections				77.60
Brought forward from 7/31/56				230.45
Final Balance on 4/23/57				308.05

Totals: Biological Sciences	316.80	
Chemistry	284.60	
Pharmacy	412.43	
Pharmacy Administration	150.78	
Graduate Instruction	308.05	
Grand Total	1472.66	
Interest on Savings Acct.	7.52	
Total Conference Treasury	1480.18	

The total Conference treasury of $1480.18 has been divided into two accounts maintained at the Big Rapids Savings Bank in Big Rapids, Michigan, as follows:

Savings Account No. 7882	507.52
Checking Account	972.66
Total Conference Treasury	$1480.18

EXPENSES OF THE SECRETARY-TREASURER

AUGUST 1, 1956 TO APRIL 23, 1957

Nov. 30, 1956	Check received from AACP for Conference expenses sent by Sec.-Treas. Webster	$ 50.00	
Total Income			$50.00
August 1, 1956	Deficit brought forward	$ 18.58	
Dec. 1, 1956	The Oakland News (printing receipts)	16.18	
April 20, 1957	Postage, msc.	7.52	
Total Expenses		$ 42.28	$42.28
April 23, 1957	Balance on hand		$ 7.72

I hereby certify that the expenses as listed above, totaling $42.28, were incurred during the year 1956-57 in conducting the business of the AACP Conference of Teachers. The balance on hand, $7.72, is in my possession as petty cash.

(Signed) Edward P. Claus,
Secretary-Treasurer
Conference of Teachers

April 23, 1957

Quite possibly, we could stand being a little less scholarly and pedagogic if, by so doing, we might help steer the profession into a pathway less beset with challenges and threats to its existence.

Linwood F. Tice, Am. J. Pharm. Ed., 19, 796 (1955)

PRESIDENT'S SECTION . . . . . .

At the conclusion of the 1957 meeting of the American Association of Colleges of Pharmacy, Dr. Swinyard, Chairman of the Conference of Teachers, appointed a committee to study the possibility of including subscription to this journal as a part of the dues of each section member. I wholeheartedly approve of Dr. Swinyard's action and hope the committee will recommend *Journal* subscription as a part of the membership dues. At the same time, I think it is unfortunate that lack of faculty interest makes such a committee necessary.

Several years ago the Teachers' Conference discussed this problem, and, as I recall, voted against including *Journal* subscriptions as part of the dues. No doubt there were and are good arguments against making subscription to the *Journal* more or less compulsory. On the other hand, there are many compelling reasons why faculty members should subscribe to our own publication.

The number of full-time faculty members, other than deans, who now subscribe to the *Journal* is pitifully few. Out of over 900 faculty members who make up the teaching staffs of our seventy-five member colleges, only 210 have *Journal* subscriptions. That so few subscribe seems almost incredible to me. Perhaps we have been operating the AACP on the wrong philosophy. Membership in the Association has been and is paid for by the college. Until recent years, faculty members were required to pay nothing to obtain all of the benefits of the Association activities. For the past several years, they have been required to pay one dollar for membership in one of the teachers' sections. I know of no other organization that offers so much for so little. Yet, when asked to pay five dollars for a *Journal* subscription, only a handful are willing to do so. The incongruous part of this situation is that many of these individuals willingly pay more than five dollars for membership and journal subscriptions to other groups. For example, a large number of our teachers of pharmaceutical chemistry subscribe to the *Journal of the American Chemical Society*. While I do not know the actual number taking this journal, I think more of them subscribe to it than do to the *American Journal of Pharmaceutical Education*. I believe a similar situation exists, but perhaps to a lesser degree, in the other professional areas.

In raising this point, I'm not suggesting that the teachers should not subscribe to journals in other fields. I am suggesting, however, that they should subscribe to our journal as well.

While our journal deals more with teaching methods, course content, and related educational problems, and not with the results of scientific laboratory research, its contents are as important to good teaching as are the research results. These latter will help improve lectures and keep them up to date, but the former will help make the over-all course better and more useful to the student. It seems to me that in order to keep abreast of the many changes in pharmaceutical teaching, our journal is an absolute must. In visiting schools from time to time it is often obvious that the

faculty members have not kept up with the contents of the *Journal* and are unfamiliar with many of the good ideas presented therein by their colleagues from other schools.

If we who are teaching cannot support our own literature, who can we expect to do it? We often criticize retail pharmacists for failing to support their organizations, but are we doing any better? In this instance, I think it is obvious we are not. Our journal needs your help, but more important, the *Journal* will be of even greater help to you. Five dollars seems a small amount to ask for the support of your teaching profession. If you are one of the many who do not now subscribe, I hope you will do so right away.

Tom D. Rowe

If pharmacy is rendering a service to the state, then it is worthy of not only that support which its present service merits but of that great support which will provide facilities to improve the training of our future pharmacists so that they will be capable of rendering a broader and more efficient type of service.

Bernard V. Christensen, Am. J. Pharm. Ed., 14, 327 (1950)

EDITORIAL . . . . . .

(Based in part upon a presentation by the Editor to the Section of Pharmaceutical and Biochemical Journal Editors, Fourth Pan-American Congress of Pharmacy and Biochemistry, Washington, D.C. 1957.)

In the few years that I have been editor of the *Journal*, I have become conscious of the responsibilities of pharmaceutical editors to make their publications instruments in the solution of problems and medias to form reasoned and informed opinions. They have a responsibility in the continuing effort of educating the members of the profession about the vital issues before the profession—a responsibility which I think is too often neglected.

We have many journals, regional and national, in this country which appear to have things to sell but very little to say. In fact, I wonder if all of them are necessary—even desirable. It appears in many instances that they have superintendents known as managing editors and wage earners known as editors. Between the voluminous advertising, the true meat of the publications seems to be journalistic quick lunches manned by short order reporters.

First, I should like to say something about editorials. It appears to me that most editors in writing their editorials desire more to win friends than to influence people. The editorial page has become a vestigial organ in a body plundered for capital gain. It appears that the editor lets his business instinct be his guide and is reluctant to antagonize the most conservative. Most editorials so resemble vanilla pudding, they wouldn't offend Republican pharmacists in central Nebraska—the most conservative people I know. In short, the editors seem to have nothing to say and say it tediously. Atrophy of the editorial page is, in my opinion, one of the greatest tragedies in American journalism. It seems to me that a first-class editor should seek out the problems of the day, focus attention on them, speak frankly, and bend every effort within his sphere of influence to improve the profession and to have as his whole guide the single allegiance to his conscience and his principles.

It is the simplest thing in the world to avoid offense, to uphold the status quo, and ever to see the silver lining in every cloud. But an editor who is worthy of the title must jog the conscience and set the reader to constructive thought rather than simple reflection.

The reader who lays down an editorial with the words, "Well, that's just what I think," is a 100 per cent contented subscriber and devoted admirer. There is no flattery more subtle than to make him feel the editor has ascended to his intellectual level. But such an editorial, you can be sure, is little more than polite palaver. And the editor is doing little for the reader or for the profession. Reforms are brought about usually by men whose convictions give them no peace, within whom conflict between what they deem wrong and right creates a white heat of words which permeates the journal and bubbles over in the editorial page. Where are these editors in pharmacy? In the late nineteenth century were men of conviction who wrote with a purpose and made themselves great by what they accomplished. They didn't placate all the readers. Assaults on pioneer editors in the West were common then. In Kansas the editor of the

Medicine Lodge *Cresset* kept a loaded pistol on the pine table he used as a desk. In Texas, Albert Tyson, editor of the Rising Star *X-Ray,* boasted he was a fighting editor with a quick trigger finger. A contemporary, Alvin S. Peek, claimed he had issued newspapers in nine states and territories and had shot eleven men who took exception to his editorial opinion. In Lawrence, Kansas, in 1888 a young reporter, William Allen White, kept a baseball bat hidden beside his desk for defense, and on one occasion carried two pistols in his pocket. We've gone past the days of common physical violence, but I should like to ask you, how long has it been since you read a virile editorial in a journal directed to the practicing pharmacist? It seems to me an editor should be known for what he fights for and what he fights against. Otherwise he is little more than an assembler, and occasionally a commentator on a passing parade at which he is a spectator rather than a standard bearer.

An editor has the responsibility to make people think and to examine their beliefs and prejudices. He must challenge their present conceptions.

Dana whose *New York Sun* was one of the best written and most original papers in our history once wrote an associate on his staff: "Your articles have stirred up the animals, which you as well as I recognize as one of the greatest ends of life." This quotation reminded me of a letter I received from Dr. Lyman. He wrote to me after I had written a rather controversial editorial: "You're keeping the Indians stirred up, and that's progress." The Indians in this instance were pharmaceutical educators.

Neither do I think editors should translate prejudices and obsessions into more or less coherent literary form. There is no substitute for digging up facts before forming opinions and certainly before championing them in print.

There is much to be done to better pharmacy, and editors aren't doing much about it. They must speak more and more for all of pharmacy and less and less for their advertisers and subscribers. One area in which I believe editors have not placed their full support is the backing of educators. I see too few articles and editorials extolling the virtues of more education for pharmacists and too many questioning educational progress. I know of no more dedicated group than pharmaceutical educators who have the interest of the future of the profession at heart. And pharmacy is where it is today because of the education of pharmacists, and it will be better tomorrow because of the upgrading of educational standards—brought about by pharmaceutical educators. Yet I don't see that the program has the fervent support of the pharmaceutical press. It is much easier, I'm sure, to placate the practicing pharmacist-subscriber-buyer and disregard the educator. But I should like to say a first-class editor discovers problems, focuses attention on them, and presents his readers all sides of the issue and his own educated opinions. An editor must have a divine mission, a mission such as that which exhilarated the prophets as they cautioned mankind against its foibles. Possibly the fault of the rather passive approach to the problems of education which seems to be the rule among editors is not wholly the fault of the editors. I think it behooves every educator, and particularly every dean, to examine his own activities throughout the past few years to determine if he has done everything possible to educate the press in his area of the changes and advances in pharmaceutical education. He should enlist the aid of the pharmaceutical press as a medium of educating the practicing pharmacist concerning education. For certainly when editors speak of education they can do much harm if they are not acquainted with the aims and objectives of the

changing scene of education. And whereas it is the responsibility of the editors to speak with an educated voice, it is also the responsibility of the educators to make that enlightenment as quick, as reasonable, and as accurate as possible.

In another area of the activities of the pharmaceutical press I find one of the most strangely amusing paradoxes. Editors talk about more professionalism and bemoan commercialism in the drugstore in their editorial columns, but when the choice space in their journals goes to advertising the latest deal on nylon hosiery, I should think readers would hardly take them seriously. For they are running their own enterprise in an unprofessional manner. Those editors talk professionalism but primarily publish articles on taxation, promotion of products, federal bills to get more money in the cash register, and new specialty departments. *This* is professionalism? Does a medical journal publish articles on how to make more money on a tonsillectomy? The lack of consistency seems ridiculously obvious. I am reminded of a statement of a friend of mine who was at the time assistant attorney general of the state of Washington and assisting the Washington Board of Pharmacy to write a pharmacy bill for the legislature. She said, "Before a court of law pharmacy will never have legal protection as a profession until a judge and jury can walk into a drugstore and see a profession in operation. As long as they see a business, it will be before the law, a business." And I might add it takes more than the name pharmacy in the title of a journal to make it a professional journal.

In conclusion I should like to say that it takes more than a passing comment in the editorial column to educate readers to professionalism; it takes a concerted and frontal assault coupled with personal example by everyone in the profession to move it forward. I think educators are in the driver's seat and see the pharmacy picture as they want it to be. Everyone needs to be stimulated to progressive thinking and vigorous doing. Editors can supply the fuel for the drive if they will and if you in education will help them. But it can't be done with ill-informed and placebo editorials coupled with back-scratching articles.

Pharmacy journals must be food for professional growth, not weeds for professional narcosis.

Melvin R. Gibson

The American Association of Colleges of Pharmacy has arrived at the point where it must make an important and significant decision, either to go forward or to become stagnant.

Bernard V. Christensen, Am. J. Pharm. Ed., 14, 328 (1950)

ANNOUNCEMENTS

AAAS program. The following is a tentative program of the AAAS meeting scheduled for Indianapolis, Indiana:

PROGRAM OF SECTION NP

Nine sessions: Program of AAAS Section Np.—Pharmacy, cosponsored by the American Pharmaceutical Association, Scientific Section; the American Association of Colleges of Pharmacy; the American Society of Hospital Pharmacists; the American College of Apothecaries; and the National Association of Boards of Pharmacy. Arranged by Robert C. Anderson, Eli Lilly and Company; George F. Archambault, U.S. Public Health Service; John E. Christian, Purdue University; Joseph A. Oddis, American Hospital Association; Glen J. Sperandio, Purdue University.

Local Program Advisor: Karl L. Kaufman, School of Pharmacy, Butler University, Indianapolis, Indiana.

Thursday Evening, December 26

8:00 p.m. Murat Temple Theatre; AAAS General Symposium: Moving Frontiers of Science, Part I. See AAAS General Symposium.

I. Friday Morning, December 27

9:00 a.m. Room C. Murat Temple; Session for Contributed Papers. Arranged by John E. Christian, Purdue University, Lafayette, Indiana. Robert C. Anderson, Head, Toxicology, Eli Lilly and Company, Presiding.

1. The Use of Anion Exchange Resins in the Preparation of Ethers. Edward J. Rowe and Karl L. Kaufman, Butler University. (Lantern, 8 minutes)
2. Synthesis of Substituted Amides of the Monoethyl Ester of Dephenic Acid, David S. Yoder, Ohio Northern University, and Glenn L. Jenkins, Purdue University. (Lantern, 10 minutes)
3. Synthesis of Certain Derivatives of Diphenic Acid. Adelbert M. Knevel and Glenn L. Jenkins, Purdue University. (Lantern, 10 minutes)
4. The Uniformity of Distribution of Phosphorus Compounds in Tablet Matrices Using Radioactive Tracer Techniques. Gilbert S. Banker, John E. Christian, and H. George DeKay, Purdue University. (Lantern, 10 minutes)
5. Synthesis of Epoxide Polymers of Steroidal Compounds. William F. Head, Jr., Ely Lilly and Company, and W. M. Lauter, University of Florida. (12 minutes)
6. Analysis of Phenyeprine and Its Breakdown Products by Filter Paper Chromatography. Herbert Schriftman, and Bobby B. Stern, Wyeth Institute for Medical Research. (Lantern, 12 minutes)
7. Automation in Computation (As Furnished by the Metric System). J. T. Johnson, The Metric Association, Inc. (12 minutes)
8. How Metric Advantages Can Be and Have Been Implemented in Pharmaceutical Manufacturing. Ralph Ernsberger, Eli Lilly and Company. (25 minutes)
9. The Half-Wave Potentials of Antioxidants (Purpose, Techniques, and Experimental Results). Robert A. Nash, Sharp and Dohme; William C. Purdy, and Donald M. Skauen, University of Connecticut. (Lantern, 25 minutes)
10. Isotonic Solutions VI. The Permeability of Red Corpuscles to Various Salts of Organic Acids. Donald E. Cadwallader, Jr., and William J. Husa, University of Florida. (Lantern, 10 minutes)
11. The Effect of Zinc Acetate on Red Corpuscles. Donald E. Cadwallader, Jr., and William J. Husa, University of Florida. (Lantern, 10 minutes)
12. Particle Size Measurements of Powders. S. P. Eriksen, M. J. Robinson, D. R. Reese and J. V. Swintosky, Smith, Kline and French Laboratories. (Lantern, 12 minutes)
13. A Solubility Study of the Boric Acid-Glycerin Complex. John J. Sciarra, St. John's University. (Lantern, 10 minutes)
14. A New Versatile, Photoelectric Cell Drop Counter. Richard Childs and Albert L. Picchioni, University of Arizona. (10 minutes)
15. Resonance of Pulsations in Elastic Tubes. Harry Lobel, Creighton University. (Lantern, 12 minutes)
16. A Study of the Oxidation Metabolites of Salicylic and Acetylsalicylic Acids. Ross E. Crabtree, Eli Lilly and Company; John E. Christian and John B. Data, Purdue University. (Lantern, 10 minutes)

Friday Afternoon, December 27

2:00 p.m. Murat Temple Theater; AAAS General Symposium: Moving Frontiers of Science, Part II. See AAAS General Symposium.

II. Friday Evening, December 27

8:00 p.m. (Location to be announced)
Symposium: A Pharmacological Approach to Mental Illness. Arranged by Robert C. Anderson, Eli Lilly and Company. John Nurnburger (Occupational connection not given), Moderator.

1. Chemistry, Jack Mills (Occupational connection not given). (Lantern)
2. Pharmacology. Irwin H. Slater (Occupational connection not given). (Lantern)
3. Animal Behavioral Studies. Thom Verhave (Occupational connection not given).
4. Clinical. Nathan Kline (Occupational connection not given). (Lantern)

III. Saturday Morning, December 28

9:00 a.m. Room C, Murat Temple; Contributed Papers on Hospital Pharmacy. Arranged by George F. Archambault, U.S. Public Health Service, Washington, D.C., and Joseph A. Oddis, American Hospital Association, Chicago, Illinois.
9:00 a.m. Opening Remarks and Announcements, John E. Christian, Secretary. Joseph A Oddis, Presiding.

1. Greetings—American Society of Hospital Pharmacists, George F. Archambault, Chief, Pharmacy Branch, Division of Hospitals, Public Health Service, Department of Health, Education and Welfare, Washington, D.C. (3-5 minutes) American Pharmaceutical Association. Paul F. Parker, Director, Division of Hospital Pharmacy, American Pharmaceutical Association, Washington, D.C. (3-5 minutes)
   Indiana Chapter of the American Society of Hospital Pharmacists. William Wissiman, Chief Pharmacist, Parkview Memorial Hospital, Fort Wayne, Indiana. (3-5 minutes)
   Indianapolis Branch of the American Pharmaceutical Association. Lawrence C. Weaver, Department of Pharmacology, Pitman-Moore Company, Indianapolis, Indiana. (3-5 minutes)
   American Hospital Association, Joseph A. Oddis, Staff Representative, Council on Professional Practice, American Hospital Association, Chicago, Illinois. (3-5 minutes)
2. Legal and Other Implications in the Labeling of Nursing Station Medication Containers. George F. Archambault, Chief, Pharmacy Branch, Division of Hospitals, Public Health Service, Department of Health, Education and Welfare, Washington, D.C. (20 minutes)
3. The Pharmacist and the Local Poison Control Center. Henry L. Verhulst, Assistant Director, National Clearing House for Poison Control Centers, Accident Prevention Program, Division of Special Health Services, Department of Health, Education and Welfare, Public Health Service, Washington, D.C. (20 minutes)
4. The Hospital Pharmacy Committee in Action. Robert W. Carithers, Assistant Superintendent, Methodist Hospital, Indianapolis, Indiana.
5. Economies, Economics and the Professions. J. W. Lansdowne, Manager Customer Promotion Services, Eli Lilly and Company, Indianapolis, Indiana. (20 minutes)
6. The Medical Record Librarian and Drug Reaction Reporting. Dorothy Kurtz, Chief Record Librarian, Presbyterian Hospital, New York, New York. (20 minutes)

IV. Saturday Noon, December 28

12:00 noon. Location to be announced Saturday morning; Program arranged by Eli Lilly and Company, Indianapolis, Indiana. Coordinated by J. Warren Lansdowne, Manager, Customer Promotion Services.

V. Saturday Afternoon, December 28

2:00 p.m. Room C. Murat Temple; Contributed Papers on Hospital Pharmacy and Symposium, Recent Trends in Medications. Arranged by George F. Archambault, U.S. Public Health Service, Washington, D.C., Joseph A. Oddis, American Hospital Association, Chicago, Illinois, and Glen J. Sperandio, Purdue University, Lafayette, Indiana. George F. Archambault, Presiding.

1. Hospital Pharmacist—Business Manager Extra Ordinary. Alfred A. Mannino, Sales Manager, Hospital Department, McKesson and Robbins, Inc., New York, New York. (20 minutes)
2. Legislative Controls Over Hospital Pharmacy at the State Level. Paul F. Parker, Director, Division of Hospital Pharmacy, American Pharmaceutical Association, Washington, D.C. (20 minutes)
3. Symposium: Recent Trends in Medications.
   A. (Title not supplied)
      Roy H. Behnke, Chief of Medicine, Veterans Consolidated Hospitals, Indianapolis, Indiana.

B. (Title not supplied)
Charles J. York, Director of Virus Research, Pitman-Moore Company, Indianapolis, Indiana.

C. Physical Compatibilities of Some Parenteral Admixtures, Part I—Intravenous Admixtures. Part II—Intramuscular Admixtures. Robert C. Bogash, Director, Pharmacy Service, and President-Elect of the American Society of Hospital Pharmacists, Lenxo Hill Hospital, New York, New York.

VI. Saturday Evening, December 28

Note: Room assignments and program details to be announced at Saturday morning and afternoon sessions.

5:30 p.m. Program arranged by Mead Johnson and Company, Evansville, Indiana. Coordinated by Edward W. Brady, Trade Relations Director, and Paul J. Moratz, Regional Sales Manager.

7:00 p.m. Program arranged by McKesson and Robbins, Inc., New York City, New York. Coordinated by Alfred A. Mannino, Sales Manager.

8:00 p.m. Ballroom, Claypool Hotel; AAAS Presidential Address by Paul B. Sears.

9:00 p.m. Ballroom and Adjacent Mezzanine Rooms, Claypool Hotel; AAAS Reception.

VII. Sunday Morning, December 29

9:00 a.m. Red Room, Murat Temple; Symposium: Man's Changing View of His Place in Nature. Program of AAAS, Section L—History and Philosophy of Science, cosponsored by Section Np. (Section L program includes details)

VIII. Monday Morning, December 30

9:00 a.m. Candidates Room, Murat Temple; Session for Contributed Papers. Arranged by John E. Christian, Purdue University, Lafayette, Indiana. Karl L. Kaufman, Dean, School of Pharmacy, Butler University, Indianapolis, Indiana, Presiding.

1. Gastric and Intestinal Absorption of Penicillin V. C. C. Lee, R. O. Froman, R. C. Anderson, and K. K. Chen. (Lantern, 10 minutes)
2. An Influence of a Digestible Oil on the Gastro-Intestinal Absorption of Isoniazid, Para-Aminosalicylic Acid and Promizole. James T. Oliver, University of Tennessee, and Donald B. Myers, Butler University. (10 minutes)
3. A Study of the Effects of Ultrasonics on the Particle Size of Certain Suspended Pharmaceuticals. Oscar E. Araujo, Ohio Northern University, and Patrick F. Belcastro, Purdue University. (Lantern, 12 minutes)
4. Preliminary Investigation of the Constituents of the Roots of Osage Orange. A. A. Harwood, Butler University, and Chien Li Huang, University of Maryland. (12 minutes)
5. An Inverse Isotope Dilution Analysis for Salicylic Acid. H. A. Swartz and John E. Christian, Purdue University. (Lantern, 10 minutes)
6. Comparative Lymphatic Absorption of B-Sitosterol and Cholesterol by the Rat. L. W. Dunham, R. E. Fortner, R. D. Moore, and C. N. Rice, Eli Lilly and Company, Indianapolis, Indiana. (Lantern, 10 minutes)
7. The Excretion and Tissue Distribution of C14-Carbonyl Salicylamide in the Rat. William F. Bousquet and John E. Christian, Purdue University. (Lantern, 10 minutes)

10:30 a.m. Round-Table Discussion: Metric Implementation in Pharmacy, Medicine, and Chemistry. Cosponsored by The Metric Association, Inc., J. T. Johnson, Moderator.

Participants: R. J. Dille, Ralph Ernsberger, J. F. Hollings, J. E. Schneider, R. G. Weigel.

IX. Monday Noon, December 30

12:00 noon. Luncheon and Tour of Eli Lilly and Company, Indianapolis, Indiana. Restricted to 80 persons. Registration and transportation provided as announced at each session. Arranged by Eli Lilly and Company, Indianapolis, Indiana. Coordinated by Robert C. Anderson, Head, Toxicology.

Association membership list correction. The list of institutions holding membership in the American Association of Colleges of Pharmacy found on page 289 of the Summer issue of this journal should have included Division of Pharmacy, Howard College (1952), 800 Lakeshore Drive, Birmingham 9, Alabama, Director Woodrow R. Byrum. It will be noted that this is a new address. Recently the University of Kentucky College of Pharmacy moved to Lexington, Kentucky. Its address is now College of Pharmacy, University of Kentucky, Lexington, Kentucky.

MEMORIALS . . . . . .

IT IS WITH DEEPEST REGRET THAT THIS JOURNAL ANNOUNCES THE DEATH OF ITS FOUNDER, EDITOR FROM 1937 THROUGH 1955, AND ITS CONSULTING EDITOR FROM 1956 TO THE TIME OF HIS DEATH, DR. RUFUS A. LYMAN. A MEMORIAL WILL APPEAR IN THE WINTER ISSUE.

HENRY AUGUST LANGENHAN

Members of the faculty and staff of the University of Washington, College of Pharmacy, and practicing pharmacists of the state were grieved on May 14, 1957, when Dr. Henry August Langenhan died. Dr. Langenhan is survived by his widow, Bertha Langenhan, and four granddaughters.

Henry August Langenhan was born in Ableman, Wisconsin, on March 26, 1883. He was graduated from the University of Illinois, College of Pharmacy, with the degrees Ph.G. in 1908 and Ph.C. in 1909. He was graduated from the University of Wisconsin, School of Pharmacy, with the B.S. (Pharmacy) degree in 1913. He entered the graduate school at the University of Wisconsin and earned the degrees M.S. (Pharmacy) in 1915 and Ph.D. in 1918. Dr. Langenhan was the first Doctor of Philosophy with the major in pharmacy in the United States.

Henry Langenhan was registered as an Apprentice in Pharmacy in Wisconsin in 1899, as a Registered Pharmacist by examination in Wisconsin in 1904 and in Illinois in 1906, and by reciprocity in Washington in 1926. He served as a pharmacist in retail pharmacies in Wisconsin from 1904 to 1906 and in Chicago from 1906 to 1911. He was consulting analytical chemist for Huber, Fuhrman Drug Millers for two years. He organized and supervised the dispensaries in the University of Wisconsin Clinic and Hospital from 1918 to 1922. He was manager of the Skagit Valley Golden Seal Company from 1932 to 1946.

Dr. Langenhan started his teaching career in 1908 at the University of Illinois as an assistant of pharmaceutical chemistry in which capacity he served for one year. He was instructor of pharmaceutical chemistry from 1909 to 1911. In 1911 he went to the University of Wisconsin as an instructor in pharmacy and

was promoted to assistant professor of pharmacy in 1919. In 1922 he came to the University of Washington as an associate professor of pharmacy. He was professor of pharmacy from 1927 to 1940. From 1940 to 1947 he was away from the University of Washington devoting full time to the Skagit Valley Golden Seal Company and as a consultant with S. B. Penick and Company. In 1947 he returned to the University of Washington as lecturer in pharmacy and was retired in 1953.

Dr. Langenhan was a Scottish Rite Mason and a member of the Shrine. He was a member of the American Pharmaceutical Association, Society of the Sigma Xi, the University of Washington Research Society, Phi Sigma, Kappa Psi, and was an honorary member of Rho Chi. He served as Secretary of the University of Washington Branch of the American Pharmaceutical Association from 1922 to 1932; Chairman of the Scientific Section of the American Pharmaceutical Association, 1929 to 1930; Vice President of the American Association of Colleges of Pharmacy, 1930 to 1931. He was a member of the U.S.P. Revision Committee Executive Board from 1930 to 1950. During this time he served as Chairman of Subcommittee No. 12 and as a member of Subcommittees Nos. 11 and 6. He was a member of the Recipe Book Committee from 1929 to 1936. He served on the N.F. Revision Committee since 1930. He was a member of Subcommittees Nos. 2, 3, and 4 and was Chairman of Subcommittee No. 3 from 1930 to 1940.

Dr. Langenhan's research was in the fields of phytochemical studies, dermatological preparations, galenical preparations, inorganic chemicals, and literature of pharmacy. He was recipient of the Ebert Prize in 1934.

Dr. Langenhan was held in great esteem by all who knew him. The Beta Omicron chapter of Kappa Psi is establishing the Langenhan Memorial Award. The award, given on the basis of scholastic achievement and participation in college activities, will be in the form of a plaque upon which the name of the recipient will be engraved each year.

Elmer M. Plein

NEW LITTLE PEOPLE . . . . . .

Susan Mae Vazakas—born July 1, 1957, to Dr. and Mrs. A. J. Vazakas, Temple University.

Paul Johnson Wang—born August 4, 1957, to Dr. and Mrs. S. M. Wang, Southern College of Pharmacy.

John Eric Roskos—born August 18, 1957, to Mr. and Mrs. John Roskos, Southern College of Pharmacy.

Christian Daniel Castle—born August 23, 1957, to Dr. and Mrs. R. C. Castle, University of New Mexico.

Richard Andrew Barr—born June 13, 1957, to Dr. and Mrs. Martin Barr, Philadelphia College of Pharmacy and Science.

Karyn Lynn Lawerence—born June 16, 1957, to Dr. and Mrs. Hower W. Lawerence, University of Houston.

Ruthann Lach—born July 31, 1957, to Mr. and Mrs. John L. Lach, State University of Iowa.

Jan Marie Gonet—born March 31, 1957, to Mr. and Mrs. Frank R. Gonet, New England College of Pharmacy.

Stephanie Allegra Paxinos—born June 15, 1957, to Mr. and Mrs. Robert Paxinos, New England College of Pharmacy.

Donald Bert Green—in August became the son of Mr. and Mrs. Bert Green, University of Texas.

Andrew Grover Hager—born August 13, 1957, to Dean and Mrs. George Hager, University of Minnesota.

Janet Suzanne Sinsheimer—born August 28, 1957, to Dr. and Mrs. Joseph E. Sinsheimer, University of Rhode Island.

Leda Demitra Cosmides—born May 7, 1957, to Dr. and Mrs. George J. Cosmides, University of Rhode Island.

MARRIAGES . . . . . .

Mr. Jerold Newburger, Instructor of Physics, Temple University, to Miss Joan Ominsky, June 23, 1957.

Mr. Arthur C. Lytle, Ohio State University, to Miss Mary Elizabeth Whitmer, August 31, 1957.

STAFF CHANGES

NEW STAFF MEMBERS

Rutgers University. Mr. Marvin Stern has been appointed instructor of pharmacy.

North Dakota Agricultural College. Mr. Stephen Sleight has been appointed instructor of pharmacy.

Idaho State College. Dr. Gail Stapleton has been appointed assistant professor of pharmaceutical chemistry. Dr. David A. Hill has been appointed lecturer in veterinary pharmacology.

Southern College of Pharmacy. Dr. Oliver M. Littlejohn has been appointed dean of the college. Dr. Littlejohn was formerly head of the department of pharmacy at the University of Kentucky. Dr. Larry C. Thomasson has been appointed associate professor of pharmacy and head of the department. Dr. Thomasson recently received his Ph.D. from the University of Florida. Dr. Samuel K. Laffoday has been appointed associate professor of biological sciences. Dr. Laffoday was formerly assistant professor of biology at the College of Charleston, South Carolina. Mr. Joseph M. Kitchen has been appointed instructor of pharmacognosy and curator. Mr. Kitchen was formerly an instructor at the University of Kentucky.

University of New Mexico. Dr. Erwin E. Nelson has been appointed visiting lecturer in pharmacology.

Philadelphia College of Pharmacy and Science. Dr. Mary Dunn has been appointed assistant professor of zoology. Mr. Herbert Epstein has been appointed instructor of economics. Mr. Fawzi Abu-Diab has been appointed instructor of physics. Mr. Samuel Jacobs has been appointed instructor of physics.

University of Florida. Dr. Thomas D. Malewitz from Michigan State University has been appointed assistant professor of pharmacognosy and pharmacology. Dr. Donald E. Cadwallader has been appointed research associate (on contract research). Dr. Warren E. McConnell from the University of Michigan has been appointed director of pharmaceutical services of the teaching hospital and clinics and associate professor of pharmacy.

State University of Iowa. Dr. David P. Carew has been appointed assistant professor of pharmacognosy. Dr. Carew recently received his Ph.D. from the University of Connecticut.

Purdue University. Dr. Tom S. Miya has been appointed associate professor of pharmacology, replacing Professor C. J. Carr. Dr. Miya was formerly associate professor of pharmacology at the University of Nebraska.

Wayne State University. Mr. J. Verne Crandall has been appointed associate professor of pharmacy. Mr. Henry E. Melton has been appointed special instructor of pharmacy.

Brooklyn College of Pharmacy. Mr. John G. Scully has been appointed to the faculty of chemistry department. He was formerly assistant professor of pharmaceutical chemistry at Creighton University.

University of Michigan. Dr. John Autian, formerly of the University of Maryland staff, has been appointed assistant professor of pharmacy. Dr. Ara G. Paul, formerly of the staff of Butler University, has been appointed assistant professor of pharmacognosy.

University of Arizona. Dr. Mary Caldwell, formerly professor of bacteriology and head of the department, has been appointed professor of pharmacology and research pharmacologist.

University of Colorado. Dr. Wells A. Shulls has been appointed associate professor of microbiology and public health. Dr. Shulls was formerly a research associate with the Wayne State University Medical School, Microbiology Department.

Howard College. Mr. Martin L. Robinette has been appointed assistant professor. Mrs. Juanita P. Horton has been appointed instructor. Mr. William L. Hawkins has been appointed instructor.

University of Texas. Dr. E. H. Djao, formerly of the staff of the Detroit Institute of Technology, has been appointed assistant professor of pharmacognosy.

University of Tennessee. Dr. William Djerf has been appointed instructor of pharmacy. Mr. Djerf received his M.S. degree from the University of Tennessee.

New England College of Pharmacy. Dr. LeRoy Keagle has been appointed president (see news section). Dr. Russel E. Brillhart, formerly Assistant Dean and Professor of Pharmacology at the Rhode Island College of Pharmacy and Science, has been appointed professor of pharmacognosy and biology and chairman of the department. Mr. Samuel Silverman, Executive Secretary and General Counsel for the Massachusetts State Pharmaceutical Association and General Counsel for the Boston Association of Retail Druggists, has been appointed associate professor of pharmaceutical jurisprudence.

University of Arkansas. Mr. George P. Provost, formerly of Mercy Hospital, Watertown, New York, and Miss Mae Hong, formerly of St. Mary's Group Hospital, St. Louis, Missouri, have been appointed to the staff of the Medical Center Hospital.

College of Pacific. Mrs. Cisco Kihara, formerly of Idaho State College, has been appointed administrative assistant to the dean and instructor of pharmacy. Dr. Donald Y. Barker has been appointed assistant professor of pharmacy.

University of California. Mr. Walter Singer has been appointed acting assistant professor of pharmacy. Mr. Vincent Gardner has been appointed instructor of pharmacy administration.

Fordham University. Dr. Louis N. Elowe has been appointed associate professor of pharmacy. Dr. Elowe was formerly a member of the University of Toronto staff. Mr. Ira Sharenow has been appointed lecturer of professional law. Mr. Friedrich Wallenberger has been appointed instructor of chemistry. Mr. Joseph McSweeney has been appointed instructor of biology. Mr. Paul Buday will join the faculty as assistant professor of biological sciences February 1. Mr. Buday is a candidate for the Ph.D. degree in pharmacology at Purdue University.

CHANGES IN STAFF TITLES

Rutgers University. Dr. Morton J. Rodman has been promoted from associate professor of pharmacology to professor; he will maintain the title of chairman of the department of biological sciences. Dr. Louis King has been promoted from assistant professor of pharmacy to associate professor; he will serve as assistant dean and maintain the title of chairman of the pharmacy department. Mr. George Richard Kedersha has been promoted from assistant professor of pharmacy administration to associate professor and is chairman of that department.

Ohio State University. Dr. Jack L. Beal has been promoted from assistant professor of pharmacognosy to associate professor.

Southern College of Pharmacy. Dr. Minnie M. Meyer has been appointed assistant dean. Dr. S. M. Wang has been promoted from associate professor of pharmaceutical chemistry to professor and head of the department. Dr. Douglas Johnson has been promoted from associate professor of biological sciences to professor and head of the department. Mr. Charles R. Boyles has been promoted from assistant professor of biological sciences to professor.

Massachusetts College of Pharmacy. Dr. Heber W. Youngken's title has been changed from research professor of pharmacognosy and botany to emeritus professor of pharmacognosy and botany. Mr. Mitchell J. Stoklosa has been promoted from associate professor of pharmacy to professor. Dr. John W. Schermerhorn has been promoted from assistant professor of pharmacy and research associate to associate professor of pharmacy. Mr. James Mickles has been promoted from instructor of chemistry to assistant professor. Dr. Ronald N. Duvall has been promoted from instructor of chemistry to assistant professor. Mr. John Fay, Jr. has been promoted from assistant in pharmacy to instructor of pharmacy.

University of Florida. Dr. Randall Tinker has been promoted from interim assistant research professor to assistant professor of pharmacy.

State University of Iowa. Mr. John L. Lach has been promoted from assistant professor of pharmacy to associate professor. Mr. Seymour M. Blaug has been promoted from assistant professor of pharmacy to associate professor.

Purdue University. Dr. Adelbert Michael Knevel has been promoted from instructor of pharmaceutical chemistry to assistant professor. Dr. Knevel received his Ph.D. from Purdue in June, 1957. Dr. Gilbert Stephen Banker has been appointed assistant professor of pharmacy. Dr. Banker was formerly a Purdue Research Foundation Fellow and received his Ph.D. from Purdue in June, 1957.

University of South Carolina. Mr. Robert W. Morrison has been promoted from acting dean of the school of pharmacy to dean.

University of Colorado. The title of Mr. William Lucas has been changed from instructor of pharmacy to instructor of pharmacognosy.

New England College of Pharmacy. Dr. Eugene A. DeFelice has been promoted from associate professor of biochemistry and microbiology to professor of biochemistry, microbiology, and public health. Mr. Yousuf Kurkjy has been promoted from assistant in chemistry to instructor.

For us to use the passing of state board examinations as a criterion of the effectiveness of instruction in pharmacy would be reverting to cram and trade school instruction.

J. Allen Reese, Am. J. Pharm. Ed., 15, 495 (1951)

GENERAL NEWS

Connecticut to build research institute. Supported by a grant from the National Advisory Council on Health Research Facilities of the Department of Health, Education and Welfare and a matching state appropriation, the University of Connecticut is soon to have a new building housing a pharmacy research institute adjacent to the School of Pharmacy on the campus at Storrs.

The three-story building will accommodate facilities for research in pharmacy (first and second floor), pharmacognosy and pharmacology (share top floor). The first two floors will include such laboratories as analytical control and materials testing, ointment and liquids manufacture, tableting and coating, ultrasonics, as well as a bulk product storage and receiving room and several large and small individual research laboratories. The third floor will include a general pharmacognosy and general pharmacology laboratory and such service facilities as an animal room, fermentation room, and shaker room. The approximately 9,000 square feet of space presently devoted to research in the School of Pharmacy will be used for pharmaceutical chemistry, radioisotope and animal experimentation. Plans call for occupancy of the new institute in September, 1960.

Griffith leaves for Israel. Dr. Ivor Griffith, President and Dean of the Philadelphia College of Pharmacy and Science, left by Swiss Air on Tuesday, September 10, for an extensive tour of Israel and a conference with the board of regents of the Hebrew University of Jerusalem.

Prior to his leaving, he and Mrs. Griffith were feted at a going-away dinner in the Sheraton Hotel. The dinner was attended by more than 100 local dignitaries and civic leaders, including leaders in the fields of pharmacy and medicine, as well as several representatives from the Hebrew University, including Dr. Frederick R. Lachman, Israeli archaeologist now on leave of absence from the University.

Dr. Griffith is national chairman of a campaign to raise $1,000,000 for a new school of pharmacy for Hebrew University.

Dr. Robert L. Swain, Editor of *Drug Topics* and a vice chairman of the campaign, was principal speaker and master of ceremonies at the bon voyage dinner to wish Dr. Griffith success on his tour.

"Object of the tour," said Griffith, "is to consult with the regents of the Hebrew University on the establishment, construction and function of the new school of pharmacy to be built on the new university campus at Givat Ram."

New buildings are now under construction on the new campus with funds received from around the world. The faculty, according to prominent educators in this country, is one of the finest in the world, and it includes scholars who participated in the discovery of the famed Dead Sea Scrolls and who are now studying them alongside other world-famous historians.

On his way to Israel, Dr. Griffith will stop for a short visit in the town of Bangor near his birthplace of Rhiwlas in Carnarvon, Wales, where he will be feted in honor of his returning home after leaving a half-century ago.

On his return from Israel in mid-October, Dr. Griffith will be the guest of honor at a dinner scheduled for October 23 at the Bellevue-Stratford Hotel.

At the dinner Dr. Griffith will report results of his tour to the American Committee for the School of Pharmacy at the Hebrew University.

Rho Chi research award. The Rho Chi Society at its national convention in New York, May 1, 1957, adopted a chapter award program to be inaugurated September, 1957. The program provides for a cash award of $250.00 to be given to the chapter which during the year makes the most substantial contribution, by way of program or otherwise, to the encouragement of qualified undergraduate students to enter graduate education in the pharmaceutical sciences. The award is known as the "Rho Chi Chapter Award."

The program calls for Rho Chi chapters, in competition for the award, to submit a written report on their activities to a committee on Rho Chi Chapter Award which will act as judge. The members of this Committee, appointed by Dean Roy A. Bowers, President of Rho Chi, are: Chairman, Dr. Milton L. Neuroth, College of Pharmacy, Medical College of Virginia; Dr. George L. Webster, College of Pharmacy, University of Illinois; and Dr. W. Lewis Nobles, School of Pharmacy, University of Mississippi. The award is to be made at the national Rho Chi convention to be held in the spring of 1958. At that time the winning chapter is expected to present a summary of its activities resulting in the award.

The award is to be used in any fashion by the recipient chapter to support or stimulate pharmaceutical research at the institution with which the chapter is associated.

The adoption of an award program on a national level by the Rho Chi Society has been under consideration for a number of years. In 1937 the Society initiated a fund, known as the "Rho Chi Cumulative Research Fund," with the idea of using the interest, once the fund reached $10,000, to support or stimulate research in the pharmaceutical sciences. The fund now has reached that goal. As a means of seeking the objectives for which the fund was initiated, the Society has established the Rho Chi Chapter Award.

Hospitals studied at Michigan. Better pharmacy and prescription service for patients in smaller hospitals is the goal of University of Michigan College of Pharmacy researchers investigating pharmaceutical services in Michigan hospitals of less than 100 beds.

The study is one of fourteen projects made possible through a 1956-57 legislative grant of $300,000 to the University of Michigan for human resources research. College of Pharmacy researchers limited their study to hospitals with less than 100 beds, as it was known that among hospitals with more than 100 beds throughout the U.S., 90 per cent have full-time pharmacists to compound hospital patients' prescriptions on the spot.

Data obtained on hospitals of less than 100 beds in Michigan show that only thirty of the 102 hospitals surveyed utilize the services of a professional pharmacist on a full- or part-time basis. These vary from nine hospitals with a full-time man, to nine with a part-time professional, to twelve with merely informal arrangements with local retail pharmacists.

The remaining small hospitals, which make up 70 per cent of those surveyed, have their prescriptions compounded at a local drugstore. Pharmacy college investigators, under the direction of Dr. Alex Berman, state in their report that small hospitals need more than just prescription compounding from the professional pharmacist.

Hospitals need the comprehensive services of a pharmacist, the report says, adding that the pharmacist should work closely with the administrator, nursing staff, and medical staff. "He should be able to introduce and supervise a significant program of drug control and standardization."

The report adds that "although compounding would be an important element of this program, it should also include other elements such as purchasing, dispensing, labeling, hospital formulary, records, pharmacy and therapeutics committee, costs, pricing of drugs to patients, manufacture, and policy."

Half of the administrators in the seventy-two hospitals with neither part- nor full-time pharmacists stated financial problems as making it impossible for them to employ a pharmacist.

Of the thirty hospitals with pharmacies, many administrators stated that "employing a pharmacist had greatly improved the financial status and efficiency of their pharmacy operation, and were enthusiastically convinced that all small hospitals should follow suit in obtaining the assistance of a professional pharmacist."

The report points out that total annual purchases of drugs, excluding anesthetic gases, of the ninety-six hospitals from which financial data could be obtained, was $1,447,889. "The total annual purchases of drugs by small hospitals in Michigan is a significant factor in the over-all expeditures of these institutions," the report notes.

From this, the report adds, it would seem that the smaller hospitals have a considerable financial and legal stake in maintaining efficient controls, which a professional pharmacist is capable of providing.

Most of the administrators interviewed expressed strong interest in having the University of Michigan College of Pharmacy develop some program along the lines of extension work institutes, workshops, or other forms of field work dealing with pharmacy services in small hospitals.

The project will continue during the coming year, according to Dr. Berman, under a new grant for human resources research from the State Legislature. Dr. Berman states "We expect to do case studies, to be carried out by a specialist from our College of Pharmacy, who will seek, under 'workshop' conditions, the extent to which a community pharmacist can provide a substantial service to the hospitals. From this study, it is expected that the professional services of the community pharmacist will be readily available to the small hospitals.

"As a college of pharmacy supported by the people of Michigan, we have an educational and moral responsibility to train professional people who can make a significant contribution to the community through retail pharmacy, hospital pharmacy, industry, and research.

"We feel that the professional pharmacist is able to render outstanding service to the small and large hospitals of Michigan in terms of efficiency, safety, and economy to the patient," the report concludes.

Predictive test article. Miss Suzanne D. Hill of The George Washington University published the article, "The Relationship Between Grades and a Predictive Test Battery in the School of Pharmacy of the George Washington University," in Volume 41, No. 1, 1957, issue of *Journal of Applied Psychology*. The pre-

dictive battery of four tests included the American Council of Education Psychological Examination for College Freshmen, the Ohio State Psychological Examination, Part 3, the Purdue Mathematics Training Test, Form XM, and the Iowa Chemistry Test. Miss Hill found that a sample which included all students taking the entire battery of tests during the years 1949-53, a total of seventy-four cases, indicated that the battery of four tests showed a substantial validity with grades in the School of Pharmacy and that elimination of the Purdue Mathematics Training Test from the battery did not decrease the effectiveness of the battery.

Lunsford Richardson Awards. Lunsford Richardson Pharmacy Awards totaling over $8,000 were presented recently to pharmacy students and Schools of Pharmacy representing four geographical regions of the U.S.

The awards, designed to encourage pharmacy students to "explore and investigate current problems of pharmacy," are presented annually by the Vick Chemical Company. Winners were selected on the basis of the quality of manuscripts submitted.

First prize checks of $1,000 went to Mr. Robert A. Nash of the University of Connecticut, Messrs. Alexander H. C. Chun and Robert S. Joslin, co-authors, of Purdue University, Mr. Donald E. Cadwallader, Jr., of the University of Florida, and Mr. Gerhard Levy of the University of California. Their respective Schools of Pharmacy received an equal amount.

Honorable mention awards of $100 each were presented to Mr. Paul M. Meer and Mr. Norman L. Henderson, co-authors, of Temple University, Mr. James E. Tingstad of the University of Wisconsin, Mr. John J. Sciarra of the University of Maryland, and Mr. Earl P. Siechert, Jr., of the University of Southern California.

Presentation of awards was made at Connecticut by Dr. M. L. Moore, Vice President of Vick and Chairman of the Awards Committee; at Purdue by Dr. F. J. Murray, Assistant to the Vice President for Research of the Wm. S. Merrell Company, a Vick subsidiary; at Florida by Mr. Allen Casey, Southeastern Divisional Manager of the Merrell Company; and at California by Mr. L. J. Velte, Western Division Manager of Vick.

All papers were judged by a panel of three pharmacy educators and editors: Dr. Louis C. Zopf, Dean of the College of Pharmacy, State University of Iowa and Chairman of the Executive Committee of the American Association of Colleges of Pharmacy; Dr. Justin L. Powers, Editor of the *Scientific Edition, Journal of the American Pharmaceutical Association* and Chairman of the Committee on the *National Formulary;* and Dr. Linwood F. Tice, Past-President, Association of American Colleges of Pharmacy, Editor, *American Journal of Pharmacy,* and Director, Pharmacy Department, Philadelphia College of Pharmacy and Science.

Mr. Nash wrote on "The Oxidation Potentials of Antioxidants in Drug Stabilization." Messrs. Chun and Joslin wrote on "The Application of Hydrophile-Lipophile Balance to the Principle of Mixed Emulsifying Agents." Mr. Cadwallader wrote on "Some Physical and Biological Factors Involved in Intravenous Formulations." Mr. Levy wrote on "The Relation of Method of Preparation to the Viscosity and Stability of Tragacanth Solutions."

The Awards originated in 1955 as a tribute to Lunsford Richardson (1854-1919), founder of the Vick Chemical Company, and to his son Lunsford (1891-1953), who devoted his entire business life to the company. They were established in the belief that they will encourage graduate and senior pharmacy students: (1) to explore and investigate current problems of pharmacy; (2) to summarize and present their findings for the benefit of other students and investigators; and (3) to broaden the scope of their interest in professional pharmacy.

Kappa Epsilon awards. Kappa Epsilon, honorary professional fraternity for women in pharmacy, meeting in convention the week end of May 17, at the University of Wisconsin, Madison, Wisconsin, announced the fraternity scholarship awards. Kappa Epsilon is primarily interested in an improved scholarship for women in pharmacy and offers a Scholarship Award on a yearly basis for the student or students with the highest scholastic achievement. The awards for 1956-57 were given to Pearl Bremer, of the University of Nebraska, Beta Chapter; and to Karen Netherly of Purdue University, Pi Chapter, who both attained a 4.00 (A) average, the best of all student members of Kappa Epsilon.

The Scholarship Cup awarded to the chapter attaining the highest scholastic average is awarded as a ten-year rotating cup, and was awarded as a permanent trophy, to North Dakota Agricultural College, Iota Chapter, who had won it the most times during the decade 1946-1957. The new Scholarship Cup was earned by the University of Nebraska, Beta Chapter, with a 3.22 Chapter average.

The Zada M. Cooper Award, to an undergraduate Kappa Epsilon student with outstanding scholastic record, went to Ingrid Lemberg, North Dakota Agricultural College, Iota Chapter, with a 3.97 average. This award was established to honor Miss Zada Cooper, Founder of Kappa Epsilon, who taught for many years at the University of Iowa.

The University of Wisconsin, Zeta Chapter, reported the highest number of students among those with scholastic averages of 3.80 or better; of all students reported at least 55 per cent reported a 3.00 average or better; while 19 per cent received 3.50 or better, and three students reported a 4.00 average.

Arizona poison control center. Statewide service to poison control centers in key hospitals throughout Arizona is the objective of the Poison Control Information Center at the University of Arizona College of Pharmacy.

The University of Arizona center has been established as part of the nationwide program recommended by the American Academy of Pediatrics, which is being sponsored in this state by the Academy's Arizona chapter with the support of the Arizona State Medical Association.

The information center at the University of Arizona Pharmacy College is creating a master file of all known poisons and their antidotes. It includes data on the poisonous ingredients of insecticides, weed-killers, and many other household, agricultural, and commercial products in common use. Misuse of these products by children and others has become a major health hazard. As an increasing number of such products are marketed under new brand names, the rapid identification of their ingredients has become essential for hospitals and doctors in treating victims of accidental poisoning.

Major function of the University of Arizona center will be to channel this vital information to poison control centers which Dr. Willis R. Brewer, Dean of the University of Arizona College of Pharmacy, hopes will soon be set up at hospitals throughout Arizona. Initial target is the establishment of units in all major hospitals with 150 beds or more, and at smaller hospitals strategically located to serve all areas of the state.

A poison control center has already been set up at the Tucson Medical Center, and is operating on a twenty-four hour basis. Under the auspices of the Maricopa County Medical Society, Phoenix has had a poison control program since about 1955, operated under the immediate direction of Dr. Paul Jarrett of Phoenix. It is expected that this program will enter into the statewide, information-sharing program.

Other communities where hospitals have been invited to participate and set up poison control centers are Ajo, Douglas, Flagstaff, Ganado, Grand Canyon, Holbrook, McNary, Prescott, Safford, and Yuma.

Dr. Virginia Cobb of Tucson, chairman of the Poison Control Committee of the Arizona chapter of the American Academy of Pediatrics, has been working toward the establishment of the statewide program for the past ten months. Cooperating groups include the Arizona Medical Association and the Arizona Pharmaceutical Association.

The Tucson Medical Center Unit has been set up with the help of the Tucson Medical Center Auxiliary, which purchased a master file of poison information from the University of Florida as the nucleus for Arizona's master file. The Tucson's Women's Club is engaged in raising $5,000 to assist the University of Arizona College of Pharmacy in setting up and administering its Poison Information Center during its first year of operation, after which it is expected this service will be supported by state funds.

Under the poison control procedure outlined by Dean Brewer, the first step in a case of poisoning is to call a physician or other first aid personnel, such as the Red Cross, sheriff's office, police or fire department, or a pharmacist. Second, the nature of the poison, under its commercial trade name and the latest recommended antidotes, can be checked at the hospital poison control center. The hospital poison center, which functions on a twenty-four hour basis, maintains a locker of antidotes, reagents and instruments for instant use by physicians, as needed.

After treatment, the physician files a report, which does not identify the patient, with the University of Arizona Poison Control Information Center. This report gives the nature of the toxic ingredient, the antidote employed, how well it worked, size of the dose, the time the poisoning occurred, elapsed time before treatment, time for antidote to be effective, how and where the poisoning occurred, and whether it was accidental.

The University of Arizona information center then distributes the information it receives to poison control centers at Arizona hospitals. It will also issue reports to the press, radio, and television, as part of a preventive educational program, and to members of the health professions through professional medical and pharmaceutical journals. In Arizona, these include *Arizona Medicine*, official journal of the Arizona Medical Association, and *Arizona Pharmacist*, the journal of the Arizona Pharmaceutical Association.

Reports will also be sent by the University of Arizona College of Pharmacy to the U.S. Poison Control Center clearing house in Washington, D.C., which will share the information with other centers throughout the country. Through a reciprocal program, the University of Arizona center will receive similar information from all over the United States.

Poison control information cards, prepared from the master file at the University of Arizona, will be distributed to poison

control centers throughout the state only after they have been approved by a committee of physicians, pharmacologists, and specialists in the basic sciences involved, such as chemistry, botany, zoology, and entomology.

The University of Arizona program, under the supervision of Dean Brewer, will be administered by Dr. Albert Picchioni, Professor of Pharmacology, assisted by Lloyd E. Burton, Instructor in Pharmacology. Seniors and graduate students will assist in the compilation of materials from reports and medical literature to be considered for inclusion in the master file.

The University of Arizona program is one of two in the entire United States where the pharmacy college is contributing a major public service through the assembly and dissemination of poison control information. The other is at the University of Florida, where the pharmacy college's poison information program has achieved national recognition for its excellence.

Plant Science Seminar. The University of Montreal was host to the Thirty-fourth Annual Plant Science Seminar from August 19 through 23. Dr. Ross M. Baxter of the University of Toronto Faculty of Pharmacy was local chairman. The seminarians were welcomed by Dean Alfred Larose of the University of Montreal, by Mr. John Richard, President of the Canadian Pharmaceutical Association, and by Dr. George Walker of the University of Toronto Faculty of Pharmacy.

Scientific papers presented include the following: "New Drugs from the Plants of the *Apocynaceae*," by Professor G. Valette: "Botany and Pharmacognosy at the Faculty of Pharmacy, University of Paris," by Professor J. August Mockle; "Comparison of Diagnostic Microscopical Characteristics of *Thymus vulgaris* and *Thymus serpyllum*," by Ikram Hassan and Marin S. Dunn; "Determination of the Relative Percentages of Selected Members of the *Labiatae* in Various Powdered Admixtures," by Harold I. Silverman and Marin S. Dunn; "Results of Chemical Screening of 4000 Plant Accessions," by J. J. Williams; "The Genus *Ptelea*—History, Geography, Chemical Constituents and Anatomy," by Virginia and Harold Bailey.

Committee reports concerning research in pharmacognosy were prepared for the Seminar by R. W. Vander Wyk, N. Farnsworth, F. Pokorny and N. M. Ferguson.

A panel discussion relating to laboratory experiments and various aids used in the pharmacognosy laboratory was led by N. M. Ferguson and E. H. Djao.

Tours and field trips included visits to the Montreal Botanical Gardens and the Laurentians.

The Edwin Leigh Newcomb awards were presented by Dr. Heber W. Youngken, Sr., at the annual banquet. The undergraduate student award was given to Mr. Elden R. Abbott of the State College of Washington. The graduate student award was given to Dr. Harold I. Silverman of the Brooklyn College of Pharmacy.

New officers elected for 1957-1958 were: Chairman, Arthur Schwarting, Storrs, Connecticut; 1st Vice Chairman, Edson F. Woodward, New York, New York; 2nd Vice Chairman, Mrs. Mary Anderson, Detroit, Michigan; Secretary-Treasurer, Frank L. Mercer, St. Louis, Missouri.

Kansas City remodels. The University of Kansas City School of Pharmacy remodeled its preparations and pharmacognosy laboratory.

North Dakota research. At North Dakota Agricultural College Dr. Fred Galysh received a grant for work in the field of pharmacology from the U.S. Public Health Service. At the same school Dr. Martin Blake received a grant from the North Dakota Heart Association to prepare derivatives of benzodioxane, and Dr. Leo Schermeister during the summer did research on volatile oils under the sponsorship of Magnus, Mabee & Reynard, Inc.

New journal of arthritis and rheumatism. The American Rheumatism Association recently announced the establishment of a bimonthly journal *Arthritis and Rheumatism* to appear early in 1958. Dr. William S. Clark will be the editor of the publication which will cover the field of connective tissue disorders, in particular rheumatoid arthritis, osteoarthritis, rheumatic fever, gout, the so-called "collagen diseases," and nonarticular rheumatism.

Littlejohn dean at Southern. Dr. Oliver M. Littlejohn has been appointed dean of Southern College of Pharmacy replacing Dr. Melvin Chambers who resigned to become director of professional relations of the William S. Merrell Company. Dr. Littlejohn received his Ph.D. from the University of Florida and was formerly head of the department of pharmacy at the University of Kentucky.

Ferguson resigns. Dr. Hugh C. Ferguson, pharmacologist on the University of New Mexico staff, has resigned to enter industry.

PCP courses for hospital pharmacists. Philadelphia College of Pharmacy and Science in conjunction with the Hospital Pharmacists' Association of Philadelphia conducted four two-week courses during the summer intended particularly for hospital pharmacists as well as other practicing pharmacists.

Tsao and DeFeo receive research grant. Dr. D. P. N. Tsao and Dr. J. J. DeFeo, University of Rhode Island, have received a grant of $1,000 from the S. B. Penick Company for pharmacognostical and pharmacological research in medicinal plants.

URI presents television series. The faculty of the University of Rhode Island College of Pharmacy in cooperation with the Rhode Island Pharmaceutical Association will present a twelve-week television series in observance of National Pharmacy Week.

The programs will be entitled "Use as Directed" and will cover the following topics: "The Evolution of the Drugstore," "The Training of a Pharmacist," "The Typical Community Pharmacy," "The Family Medicine Chest," "First Aid in the Home," "Analgesics in the House," "Tranquilizers and Sedatives — Can Be Dangerous," "The Miracle Drugs—Antibiotics," "The Importance of Health Programs—Vaccines," "Pharmacy Laws," "Vitamins," "Research in Pharmacy."

ASHP officers. The following officers were elected to serve during the 1958-59 term for the American Society of Hospital Pharmacists: President Elect, Robert C. Bogash; Vice President Elect, Clifton J. Latiolais. Mr. Bogash is chief pharmacist at the Lennox Hill Hospital in New York. Mr. Latiolais is assistant director of the audit of pharmaceutical service in hospitals which is being carried out through the Division of Hospital Pharmacy of the American Pharmaceutical Association and the American Society of Hospital Pharmacists.

Houston builds. Construction on the new $1,500,000 Fred J. Heyne Building at the University of Houston is well under way following the ground-breaking ceremony on June 18. The building will house the College of Pharmacy temporarily and the College of Business Administration. The building is named for Fred J. Heyne, long-time business associate and friend of the late Jesse H. Jones. The building, constructed in two stories and a basement, will be faced with shellstone and financed from funds given to the University of Houston Endowment, Inc. Completion is expected for September, 1958, occupancy.

Jenkins speaks in Canada. Dean Glenn L. Jenkins, Purdue University, gave an invitational lecture before the 50th Anniversary Convention of the Canadian Pharmaceutical Association at Montreal on August 15. He spoke on the subject "Why Increased Pharmaceutical Education?"

Purdue establishes scholarship fund. Recently a contribution was received from a distinguished alumnus to establish a scholarship fund in the name of the late C. B. Jordan, Dean of the Purdue School of Pharmacy from 1910 to 1941. Arrangements have been made to establish a permanent open-end trust fund to be known as the C. B. Jordan Memorial Scholarship Fund. The fund will be deposited with the Purdue Alumni Scholarship Foundation, contributions and bequests will be added to the principal fund, and all income will be used for financial aid to pharmacy students on the basis of merit and need.

Carr resigns at Purdue. Dr. C. Jelleff Carr has resigned his position as pharmacologist on the staff of Purdue University to join the Psychopharmacology Service Center of the National Institutes of Mental Health at the National Institutes of Health, Bethesda, Maryland.

DIT merger. On June 3, 1957, the Detroit Institute of Technology announced the merger of its College of Pharmacy with Wayne State University. The College was founded in 1890 as the Detroit College of Pharmacy, a part of the Detroit College of Medicine, which later became the College of Medicine of Wayne State University. In the meantime the Detroit College of Pharmacy had become an independent institution, and then became affiliated with the Detroit Institute of Technology. After forty-nine years it has now terminated this affiliation and has merged with the College of Pharmacy of Wayne State University.

Plant Science Seminar at Ferris. Announcement that the 1958 Plant Science Seminar will be held on the campus of Ferris Institute in Big Rapids, Michigan, was made by the Committee on Time and Place at the Seminar session held in August in Montreal, Canada. Dr. Edward P. Claus, Dean of the Division of Pharmacy of Ferris Institute, will serve as local secretary for the thirty-fifth annual seminar to be conducted during the week of August 18-22, 1958.

New service for researchers. Eugene Garfield Associates, 1523 Spring Garden Street, Philadelphia 30, Pennsylvania, have recently announced a new service for researchers, administrators, field representatives, and clinicians. The weekly service "Current Contents of Pharmaceutical Publications" will supply pocket-size booklets containing photographic reproductions of the current or advance tables of contents of nearly 250 periodicals.

New microchemical journal. A new journal, *Microchemical Journal*, edited by Nicholas D. Cheronis and others, will be issued semiannually by Interscience Publishers at a cost of $9.60 a year.

Brodie on sabbatical at Michigan. Dr. Donald C. Brodie, Professor of Pharmacy and Lecturer in Pharmacology at the University of California Medical Cen-

ter, San Francisco, has been granted a sabbatical leave for one year beginning July 1, 1957. Dr. Brodie is in residence at the University of Michigan where he is studying with Dr. David F. Bohr, Professor of Physiology. Drs. Brodie and Bohr will attempt to measure membrane potentials of vascular smooth muscle by intracellular recording techniques in hopes of clarifying the mechanism of action of epinephrine on vascular tissue. Their research is being sponsored by the United States Public Health Service.

AIHP requests pictures. Dr. Glenn Sonnedecker has made an appeal for historical photographs of pharmacy in action to be sent to the American Institute of Pharmacy, School of Pharmacy, University of Wisconsin, or to local historical societies with the Institute to serve as a national information center for the location of such pictures.

Morrison becomes dean at South Carolina. Mr. Robert W. Morrison, who has been acting dean of the School of Pharmacy at the University of Carolina since 1952, has been appointed dean of the school. Mr. Morrison received his M.S. degree in pharmacology from the University of Tennessee in 1931. He has been on the South Carolina staff since 1932.

Briggs Remington medalist. The New York Branch of the American Pharmaceutical Association recently announced that the 1957 Remington Honor Medal will be presented to Dr. W. Paul Briggs, Secretary and Executive Director of the American Foundation for Pharmaceutical Education, at the Remington Dinner to be held December 2, 1957, at the Hotel Roosevelt in New York City.

St. John's receives grant. St. John's University has been awarded a Health Research Facilities grant of $135,295 by the Bureau of Public Health Service of the United States Department of Health, Education and Welfare. The grant has been made for the construction of research laboratories in sciences related to health in the multi-million dollar Science-Pharmacy Hall which is being built on the university's new campus in Jamaica (Hillcrest), Queens. The Science-Pharmacy Hall is expected to be completed by September, 1958. It will accommodate about 2,500 students at one time, providing instructional and research laboratory facilities in biology, chemistry, physics, and pharmacy, on both graduate and the undergraduate level. It will be the third building to be erected on the one-hundred-acre campus where thirteen buildings are planned in St. John's twenty-five million dollar expansion program.

Keagle heads New England College of Pharmacy. Dr. LeRoy C. Keagle is the new president of the New England College of Pharmacy. Dr. Keagle will have charge of the college's curriculum, faculty, and academic program. Dr. Constantine N. Meriano was named vice president and treasurer and will be in charge of the college's business affairs and expansion program. Mary W. Meriano has been appointed administrative assistant and assistant treasurer. Prior to his appointment Dr. Keagle was for four years senior scientist in research and product development for the Warner-Lambert Pharmaceutical Company. He earned his B.S. degree at Rutgers University and his Ph.D. at the University of Maryland. Dr. Keagle has served as assistant dean and chairman of the department of pharmacy, University of Buffalo, and assistant professor of chemistry at Rutgers University.

ACA launches new publication. The American Colleges of Apothecaries has launched a weekly publication *The Voice of the Pharmacist* which will consist primarily of hard-hitting editorial copy designed to bring to all pharmacists the true facts concerning developments in pharmacy, medicine, industry, government, legislation, and any other area which directly affects the future growth and survival of the profession. The managing editor of this publication will be Mr. Robert E. Abrams, Executive Secretary of the American College of Apothecaries.

Urdang receives grant. Dr. Arnold Urdang, Brooklyn College of Pharmacy, was recently awarded the Frederick Gardner Cottrel Grant for the second year by the Research Corporation. Dr. Urdang will continue to study the sulfur derivatives of o-thymotic acid, a research project on new sulfonamides.

Loyola scholarship fund. The Louisiana State Pharmaceutical Association has presented Loyola University College of Pharmacy with an $18,000 scholarship fund. The funds will be held in trust by Loyola to be used for the assistance of pharmacy students to be selected by the scholarship committee of the state association. The fund was first established in 1941 and was formerly administered by a five-man committee. Since its founding about sixty-nine Loyola pharmacy students have been given scholarship assistance amounting to more than $10,000.

Smith serves WHO. Dr. R. Blackwell Smith, Jr., President of the Medical College of Virginia, served as chairman of an international committee of experts on food additives in Geneva, Switzerland, in July. Dr. Smith was one of two members from the United States appointed by the World Health Organization and the Food Agricultural Organizations of the United Nations.

Hartung in Paris. Dr. Walter H. Hartung, Medical College of Virginia, pre-

sented a paper before the 16th International Congress of Pure and Applied Chemistry in Paris, France, in July. Dr. Hartung received a National Science Foundation Grant to attend the meeting.

Rowe elected. Dean Tom D. Rowe of the University of Michigan has been elected vice president of the Michigan Branch of the American Pharmaceutical Association. Dean Rowe also serves as vice President of the Michigan Academy of Pharmacy.

Grolle grant renewed. A research grant in pharmacy administration given by McKesson & Robbins has been renewed to enable Floyd A. Grolle, Instructor in Pharmacy Administration, University of Michigan, to complete work on a series of case studies suitable for use in pharmacy management and merchandising courses.

Batuyios at Michigan. Dr. Nicholas Batuyios is beginning his second year on a United States Pharmacopeia Postdoctoral Fellowship at the University of Michigan College of Pharmacy. The Fellowship is made available by the Board of Trustees of the United States Pharmacopeia for research dealing with pharmaceutical problems. Dr. Batuyios has contributed measurably to the development and revision of drug standards. He received his Ph.D. in 1956 from the University of North Carolina. The work is directed by Dr. Albert M. Mattocks, Professor of Pharmacy and Chairman of the U.S.P. Subcommittee Number Eight — Cyclic Compounds.

Officers to Michigan. The United States Army has selected two officers from the Medical Service Corps for graduate work in hospital pharmacy at the University of Michigan College of Pharmacy. Captain Lewis C. Miner and First Lieutenant Douglas Silvernale began their studies on September 13.

Mrs. Hall receives degree. Mrs. Esther Jane Wood Hall, Assistant Professor of Pharmacy, University of Texas, has been awarded the Ph.D. degree in pharmacy administration by the University of Texas.

Trustees at New England. The new members of the Board of Trustees of New England College of Pharmacy are Dr. Nicola Bilotti, practicing pharmacist of Providence; Dr. John Griffin, Treasurer and Vice President of Joseph P. Manning Company, Boston, President of the Jamaica Plain Cooperative Bank, Trustee of Suffolk University; Mr. Charles E. Quinn, President of the Boston Chartered Life Underwriters, associated with New England Mutual Life Insurance Company, Boston. Officers of the Board of Trustees for the year are Mr. David T. Scott, Vice President, First National Bank of Boston (Chairman); Mr. Edward A. Loring, Vice President, Gilman Brothers, Inc., Boston (Vice Chairman); and Mr. Charles A. Berman, practicing pharmacist (Secretary).

Bryan resigns. Dr. Jack T. Bryan resigned from the staff of the Division of Pharmacy, Howard College, to accept a position with the Upjohn Company.

Howard College moves. The Division of Pharmacy, Howard College, began the 1957-58 school year in its new facilities on the new Howard College campus in suburban Birmingham. The campus when fully completed will occupy sixty-five acres of the more than 400-acre tract owned by the College. The new Lakeshore Drive campus will be one of the most beautiful in the South. The buildings combine Georgian architecture with functional design, providing facilities which are beautiful and also economical to operate. Built of antique sandface brick, with limestone trim and slate roofs, they are designed to provide for the College's current needs as well as for the future growth and expansion of educational services. The $525,000 Robert I. Ingalls Building with a total of 35,000 square feet will house the Division of Pharmacy, providing laboratories, classrooms, auditorium, offices, and equipment essential to an expanding program. The building has a unique temperature control system which will keep the building comfortable with automatic cooling and heating cycles.

Dr. Núñez elected in Puerto Rico. Dr. Esteban Núñez Meléndez, Associate Professor of Pharmacognosy, University of Puerto Rico, has been elected President of the Colegio de Farmaceuticos de Puerto Rico (Puerto Rico Pharmaceutical Association). Dr. Núñez was formerly secretary of the Association.

Bhatia with Abbott. Dr. V. N. Bhatia, Associate Professor of Pharmacy, State College of Washington, was employed for three months this summer by Abbott Laboratories in their North Chicago plant. He was associated with the Tablet Group of the Pharmaceutical Development Section.

Jenkins nominated. Dean Glenn L. Jenkins of Purdue University has been nominated for membership on the Board of Directors of the AAAS. Four nominees have been named, two of whom are to be elected by the Council of the Association. The results of the election will be announced at the Association meeting in Indianapolis on December 27. Dean Jenkins served as Secretary of the Section on Pharmacy from 1938 to 1955 and as Vice President and Chairman of that section in 1955-56.

BOOK REVIEWS

The Terpenes, Volume Four, The Triterpenes and their Derivatives, Sir John Simonsen and W. C. J. Ross. Cambridge University Press, New York, New York, 1957. xii + 483 pp. $13.50.

A study of the history of chemistry shows conclusively that the discovery of a new technique or the invention of a new instrument has been followed by a marked surge of progress in the science. The classical pattern is again demonstrated by the prominent position to which the chemistry of the triterpenes has been advanced during the past twenty-five years. The phenomenon of light absorption, particularly in the infrared region, and X-ray crystallography have figured most prominently in establishing the structure of the triterpenes. This statement is intended in no way to detract from the significance of degradation studies and other well-established reactions conducted by prominent investigators during the past one hundred and seventy-five years, for indeed the simple reaction of dehydrogenation with sulfur or selenium was applied with imminent success by Ruzicka, who is outstanding in triterpene chemistry. Unfortunately, this book was compiled before it was possible to make full use of the advantages provided by another technique, namely rotatory dispersion, which Djerassi and his colleagues are applying with tremendous success in the study of the steroids.

Although reports on the occurrence and chemical study of the triterpenes date back to the eighteenth century, the most pronounced advances in the elucidation of their structures are products of the twentieth century. When one reads this book, he cannot but be amazed by the vast accumulation of literature on the subject during recent years. It would seem that there is little of significance on the chemistry of the triterpenes which has not been gleaned from the literature and incorporated in the book. There are eight and one-half double-columned pages of references

As is characteristic of the late Sir John's earlier works (Vols. I, II, and III), the material is very carefully organized and is presented in a clear, concise manner. Nomenclature is difficult in this highly specialized subject; consequently, the extensive use of common names is unavoidable; however, the authors incorporate linear formulae parenthetically, wherever possible. Literally hundreds of structural formulae are well distributed throughout the book. The monograph on each triterpene (the authors prefer this term to 'triterpenoid") begins with a brief introductory passage which is followed by a highly concentrated, but by no means limited, digest of investigational work reported in the literature. Sixty-five triterpenes are so treated. This volume is concerned with a hydrocarbon, alcohols, hydroxy-aldehydes, ketones and hydroxy ketones.

Those for whom the triterpenes hold interest will find this book to be the most comprehensive treatise on the subject which has yet appeared in print. And surely they will anxiously await the announcement of Volume V which completes the series. Because of the relationship between the sterols and the triterpenes and because of the physiological significance, both actual and implied, this volume and Volume V will prove of great value to biochemists and pharmacologists as well as to organic chemists. While there is no actual, direct relationship between the triterpenes and the lower members of the terpene series, those who are interested in the essential oils or who take the isoprene hypothesis seriously will find many pages of fascinating study in this volume.

Paul J. Jannke
University of Connecticut

Cell Physiology, Arthur C. Giese. W. B. Saunders Company, Philadelphia 5, Pennsylvania, 1957. xviii + 534 pp., 253 figs., 51 tbls. $10.00.

Among the disciplines of natural science, good pedagogy ordinarily requires that instruction begin with the general and basic aspects of the discipline. To this, however, animal physiology has been an almost singular exception in that the field course, and often the only course, for most students is one dealing primarily or exclusively with some aspect of mammalian physiology. Although such courses are usually sprinkled to a variable extent with isolated elements of general physiology, the student is nevertheless often confronted with the task of "learning about" phenomena which appear disconnected and often without rational basic explanations. Although there are paramount practical and historic reasons for this anomaly, there is little doubt that a major difficulty has been the lack of an outstanding textbook suitable for a course in general physiology

at the junior or senior level. It is to be hoped that the appearance of *Cell Physiology*, an admirable introductory treatise of general physiology, will initiate the desirable metamorphosis in the philosophy of teaching physiology so that instruction in the special physiologies will be preceded by instruction in the general and basic aspects of the science.

Following an introductory section describing the scope of cell physiology and relating thermodynamic concepts to living systems there is a series of chapters dealing with the "cellular environment," including an especially good chapter on the effects of radiation on cells. The third section is concerned with the nature of the cell and protoplasm and the fourth with the passage of materials through cell membranes. The section on nutrition contains excellent chapters on hydrolysis (including mechanisms of enzyme action and Michaelis-Menten Law), release of energy in cells, redox potentials of enzymes in cellular oxidation, cellular respiration, glycolysis and fermentation, photosynthesis and bioluminescence. There are also sections on irritability and response and on protoplasmic growth.

Bearing in mind the level for which it is prepared, very little criticism can be directed toward it. The presentations are remarkably clear. There is a noteworthy avoidance of controversial material although the book does not fail to indicate the areas of sparse knowledge and incomplete understanding. Possibly the author has gone too far in the reduction of mathematical treatments, many of which are relegated to appendices. Although the use of mathematical treatments in physiology is often a source of consternation to students, both progress and appreciation of the science require an increasing emphasis in this direction. Personally, I would like to have more attention directed toward homeostasis for I have often found it difficult to impress upon students that homeostasis operates at all levels of organization, including the cellular level.

Unfortunately, I fear that from an examination of the literature cited and the general references, the student may well reach the conclusion that cell physiology is strictly a science of the English-speaking world. Even though an advanced undergraduate might not be expected to read an occasional paper in German or French (I think, however, that he should!), it would still be well to include important foreign-language titles to impress on him the international nature of the science.

This book should be carefully examined by everyone concerned with the training of students in physiology or in curricula containing one or more courses in physiology, for it clearly shows that it is now possible to begin instruction in physiology with the basic and general as a profitable foundation for the special physiologies.

Donald S. Farner
State College of Washington

Rogers' Inorganic Pharmaceutical Chemistry, Taito O. Soine and Charles O. Wilson. Sixth Edition. Lea and Febiger, Philadelphia, Pennsylvania, 1957. viii + 697 pp., 4 figs., 12 tbls. $9.50.

For many years *Inorganic Pharmaceutical Chemistry* by C. H. Rogers, Dean Emeritus of the College of Pharmacy of the University of Minnesota, has been the leading book on its subject in America. Now, having turned over completely the task of preparing new editions to two of his former colleagues, it is fitting that proper recognition has been given Dean Rogers by inclusion of his name in the title. To continue to keep the book in the forefront in its field, the authors will be challenged by the manifold changes in the practice of the profession, fundamental changes in pharmaceutical education and continuous developments in medicinal chemistry. They are fortunate in having a firm foundation on which to build.

As in former editions, the arrangement of the subject matter and discussion of it rests on the Periodic Table. Each element is discussed first as a member of a family or periodic group. Then, as warranted, a whole chapter or part of a chapter is devoted to a discussion of the element and its important compounds. Topics covered include the history, occurrence, physical and chemical properties, tests for identity and purity, commercial manufacture, pharmacology and uses of each compound. Omitted from the new edition are the sections on laboratory preparation and the complete listing of all USP and NF products in which each compound is used.

New features of the sixth edition include an introductory chapter on "Atomic Structure and Chemical Bonding" and a chapter on "Solution and Solubility Phenomena." The latter chapter is well written and is an important feature of the new revision. It should be of particular value to those students who do not have the subject covered by courses in physical chemistry or physical pharmacy. The authors are to be commended for these efforts to change the nature of the course in inorganic pharmaceutical chemistry from a purely descriptive one to one developing the correlation of chemical structure to drug action. This approach, so well developed for organic compounds, should be used for inorganic compounds as well.

The task of arranging such new material into the old format appears to have been rather puzzling to the authors. The chapters on "Acids" and "Solutions and Solubility Phenomena" appear to owe their position in the book to mere happenstance.

The latter chapter logically might have followed the introductory chapter on "Atomic Structure and Chemical Bonding." As it is now, there is duplication of material in the two chapters. Also, the placement of the chapter on "Radioactivity and Radioactive Elements" as the last chapter has resulted in duplication of material discussed in the first chapter. That nitrogen "is a somewhat nontypical member . . ." of the nitrogen family, and "because of its many unique properties . . ." must be discussed early in the book apart from other members of the family is not a fact apparent to the reviewer. No special treatment of the material on nitrogen could be discovered.

Because of arranging material only in reference to the Periodic Table, discussion of important anions is found scattered throughout the book. This lack of emphasis on the anions is the obvious result of discussing, for example, all the sodium compounds in the chapter on sodium and discussing the chloride compounds throughout the various chapters.

This new revision places this book by itself in its class. Its only competitor is outdated. It is recommended for serious consideration as a text to every teacher of inorganic pharmaceutical chemistry. It should be in every pharmacy library and might well be in every retail pharmacy as a reference book. Its discussion of the pharmacology of inorganic compounds is of particular value since pharmacology texts are notoriously brief and inadequate in this area. In addition, pertinent references are supplied and will be of help to the reader desiring extended information.

Allen I. White
State College of Washington

Scoville's The Art of Compounding, Glenn L. Jenkins, Don E. Francke, Edward A. Brecht, and Glen J. Sperandio. Ninth Edition. The Blakiston Division, McGraw-Hill Book Company, Inc., New York, New York, 1957. viii + 551 pp., 79 illus., 43 tbls. $11.00.

This book is the second revision by this group of authors of a long-standing, well-accepted text. It has been used by many of us throughout our professional training and practice. The authors of the ninth edition have maintained the same format and, unfortunately, the same level of presentation that was found in the earlier eight editions. Some changes have been made in the chapters and sections dealing with powders capsules and effervescent salts, tablets, parenteral solutions, isotonic solutions, sterilization and disinfection, and ointment preparations. Most of the changes are quite minor. The chapter dealing with ophthalmic solutions has been expanded significantly and includes a rather extensive series of references, which appear to be inadequately integrated from a teaching standpoint.

The chapters on incompatibilities have been increased from four to five. This change appears to relate primarily to organization of the subject matter rather than to scope. The discussion of the individual drugs, elements, and ions remains for all practical purposes identical to that of the sixth edition which is now twenty years old. However, a number of newer drugs have been introduced. This new edition retains much of the scientifically loose terminology that was included in the former editions, and, moreover, some of the new material introduced by the author also is loosely written. For example, on p. 519 under sulfated and sulfonated compound the following erroneous statement appears:

> The nonionic detergents such as *Triton,* the *Igepals, Glim,* etc. are similar in composition to the sulfated alcohols but are more completely sulfated or sulfonated and have no polar group, therefore do not form metallic salts and are not readily salted out of solution.

Another such example is found on p. 116 under penicillin troches in which it is stated that:

> Sodium citrate greatly increases the stability of penicillin salts. The protective action of sodium citrate is not due to the hydrogen-ion buffering capacity of the citrate, but is thought to be due to esterification of part of the penicillin molecule with consequent blocking of the enzyme system involved in the destruction of penicillin.

This explanation is chemically improbable and without scientific foundation. Numerous scientific articles are available which include statements discussing the deteriorating effect of trace metals on penicillin and likewise the action of chelating agents such as citrates in stabilizing penicillin. The literature on antibiotics is replete with valuable data that may be regarded as essential for the dispensing pharmacist. The text contains a great deal of useful information for the student in dispensing pharmacy, but in the opinion of the reviewer it has many weaknesses, and, if it is to be used as a text, the instructor will be obliged to call the student's attention to numerous erroneous or loosely worded statements and to prepare material from the literature to counteract their effects. Under the circumstances it is difficult to recommend Scoville's as an acceptable text for dispensing pharmacy course instruction.

Sidney Riegelman
University of California

New Unguent Bases and Lotions, Formulae and Uses, Isaac Kenneth Hoffman. Chemical Publishing Company, Inc.,

New York, New York, 1957. 152 pp. $4.75.

This book is small and contains somewhat over 250 formulas of ointment and lotion bases. It has a very short introductory chapter describing some of the general properties of bases and six additional chapters listing formulas of washable oil-in-water unguent bases, washable oil-in-water lotions, nonwashable water-in-oil unguent bases, nonwashable water-in-oil lotions, washable anhydrous oil-in-water unguent bases, and nonwashable anhydrous water-in-oil unguent bases.

This book should serve well as a reference book for the teacher of dispensing pharmacy who does not have a variety of base formulas but who wishes to assign different bases to each student in the class. As the author explains in the preface only a few ingredients are necessary to prepare all the classes of vehicles. This factor would be of advantage for laboratory class work.

However, *New Unguent Bases and Lotions, Formulae and Uses* has many shortcomings and errors which the author will very likely correct when the book is revised for the second edition. It does not seem that the book contains such a wide field of reference material for the pharmacist as set forth by the author in the preface. Nor does it appear that the book has much information concerning specific preparations for specific purposes.

The chapter on introduction is entirely too brief to tell much about the general properties of ointments and the diffusion of medicants from those bases. In addition, there are some errors in the write up, e.g., "density of the carbowaxes is directly proportional to their molecular weight" (the author undoubtedly meant viscosity instead of density) and "Oil-in-water emulsions generally provide the means for epidemic action only." Depending upon the medicament and the condition of the skin (intact or abraded) such bases will allow considerable absorption of the drug. The chapter also lacks a general discussion of compatibilities and incompatibilities of medicinals with the various bases.

The author has coined a unique title for each of the 250 plus formulas. These titles are for the most part not outwardly descriptive of the products. They might as well be designated by numbers. The formulas by name are not arranged alphabetically nor are they arranged by any sort of classification within each group of bases.

Relatively few constituents are used in the 250 plus formulas. The author might, in the second edition, include some of the recently discovered emulsifiers and waxes in order to bring the book up to date. More than half of the formulas contain sodium lauryl sulfate, a substance which is irritating and allergenic and which has for these reasons been dropped from the formula for Hydrophilic Ointment, USP. Self-emulsifying glyceryl monostearate is used in more than 20 per cent of the formulas. Many of the formulas vary from one another only slightly.

The author indicates in the preface that the book reveals specific information about each of the bases which is of value in formulating dermatologic preparations. However, the discussions concerning each base are incomplete and in some instances misleading. Reference is here made to such statements as "it may be used with all types of drugs"; "it is compatible with most medication, e.g., tincture of benzoin" (does tincture of benzoin represent most medication?); "bismuth subgallate and magnesium oxide combine with it to form a satisfactory lotion. Powdered drugs can also be used with this vehicle" (the first two items are powdered drugs also).

The bibliography (141 references covering the period from 1923 to 1954) not only represents an incomplete coverage of the work which has been done on dermatologic bases, but also is meaningless because no indication of what one is to expect from a particular reference is given.

The index is essentially an alphabetical listing of the bases contained in the book.

Elmer M. Plein
University of Washington

Tranquilizing Drugs, H. E. Himwich, Editor. The American Association for the Advancement of Science, Washington, D.C., 1957. viii + 197 pp., 32 figs., 26 tbls. $5.00.

This symposium on tranquilizers (and hallucinogens) was held in Atlanta by the American Association for the Advancement of Science in December, 1955. In the introduction, Leake makes some useful classifications and asks some perceptive and stimulating questions which research workers would do well to keep in mind. The first section of the symposium dealt with electro-physiological mechanisms of action. Marazzi and Hart studied a single synapse in the cat brain and found that mescaline, LSD, serotonin, and bufotenine are all powerful inhibitors of cerebral synaptic transmission. They found in the case of mescaline that chlorpromazine, reserpine, and azacyclonol prevent or reduce markedly this inhibitory effect and suggest that abnormal mental function is a disturbance of transmission equilibrium at synapses. Toman *et al.* noted that most drugs increase electroshock seizure latency (i.e., the time from onset of shock to onset of tonic phase of the seizure) but that azacyclonol and chlorpromazine do not, while reserpine actually reduces latency. They believe that latency is a manifestation of a diffuse inhibitory effect which accompanies nerve impulses and that some psychotic manifestations are due to an excess of this

effect. Tranquilizers such as reserpine would therefore be considered as acting by selective reduction of this excessive inhibition.

Hendley, Lynes, and Berger found that in the curarized cat 20 mg./kg. of meprobamate causes synchronization and the appearance of slow waves in the normally featureless electrical record from the thalamus but that the cerebral cortex, hypothalamus, and several parts of the rhinencephalic system were unaffected. With higher doses of meprobamate, slowing was noted in the electrical record of all cortical and subcortical areas. Pentobarbital and amobarbital produced synchronization chiefly in the cortex and caudate nucleus. Mephenesin caused no effects while chlorpromazine and reserpine gave equivocal results. Hendley *et al.* conclude that meprobamate more or less specifically alters the activity of the thalamus.

Himwich and Rinaldi discuss the use of benztropine methanesulfonate in extrapyramidal abnormalities which occur as side-effects of reserpine and chlorpromazine. They believe that the latter drugs cause these undesirable effects by stimulating the reticular formation which is cholinergic in function. The reticular formation together with diffuse thalamic projections also forms the activating system which evokes the alerting EEG reaction. Anticholinergics such as atropine prevent this alerting response and also correct tremors. Benztropine methanesulfonate, which is chemically related to both atropine and diphenhydramine, is effective in considerably smaller doses than atropine but probably acts through the same mechanisms.

In the second section of the symposium, which deals with metabolic factors of drug action, Grenell produces evidence to show that chlorpromazine increases ATP in the rat brain and particularly in hypothalamic tissue. He postulates that the increase in ATP is due to its reduced utilization in the hypothalamus. ATP measurements with repeated injections of chlorpromazine indicated some development of tolerance. Grenell also notes that the indole bearing LSD appears to cause a drop of ATP in the cortex. Hoffer, working with another indole compound, adrenolutin or 3,5,6-trihydroxy-N-methylindole, found that in human subjects (dose not stated), it produces thought disorder as evidenced by inability to solve proverbs and problems, reduction of anxiety, and loss of insight into intellectual performance. He points out that thought disorder is the primary characteristic of schizophrenia but that secondary phenomena such as hallucinations and delusions generally develop before the illness is recognized. Mescaline and LSD tend to reproduce the secondary aspects, but adrenolutin reproduces the primary aspects.

The third section of this symposium deals with therapeutic considerations. Toll reports that azacyclonol was effective both in schizophrenia and selected cases of neurosis. It increased awareness, ability to verbalize emotions, and was outstanding in its ability to aid establishment of rapport. It decreased auditory hallucinations but did not reduce anxiety and tension. Rinaldi *et al.* in two double-blind studies with azacyclonol observed improvement in about two-thirds of patients, most of whom were schizophrenics. Increased dosage or period of administration did not augment the improvement. They noted a remarkable absence of clinical side-effects.

Pennington obtained good results in more than 80 per cent of noisy, assaultive, hallucinated patients with meprobamate in dosages ranging from 0.8 to 9.6 gms. per day. (An improbable dose of 1 mg. of thyroid daily is also reported.) The patients became quiet and orderly and more than 20 per cent are able to return to their homes as long as medication is maintained. No side-effects were seen except for hypotension after high dosage. Gallagher and co-workers showed that in chronic schizophrenics Rauwolfia alkaloid mixtures produce therapeutic and side-effects similar to reserpine alone. Kline and his group observed that when chlorpromazine is used to potentiate reserpine the side-effects from the latter drug are reduced. Tuteur and Lepson, using the same type of combination, concluded that patients respond better to the combination than to either drug singly. Ayd in a critique of chlorpromazine and reserpine therapy observes that both drugs are invaluable in psychiatry but that each has its dangers and complications and that careful selection of patients is vital. Himwich, as editor, contributes a preface and an excellent summary of the whole symposium.

This volume is required reading for all who are interested in psychiatric drugs. The therapeutic reports emphasize the fact that their clinical use is still to a great extent empirical, while the pharmacological reports reveal that not much is yet known of their mechanisms of action. Nonetheless, they present a broad and stimulating cross-section of the various lines of investigation that are being so assiduously pursued all over the country.

Arthur Tye
The Ohio State University

Clinical Toxicology of Commercial Products, Marion N. Gleason, Robert E. Gosselin, and Harold C. Hodge. The Williams and Wilkins Co., Baltimore, Maryland, 1957. xv + 1160 pp., tbls. and indices. $16.00.

This huge volume, the fruit of the prodigious labors of a University of Rochester research team, is destined to become the

definitive reference work for all concerned in any way with the problem of accidental poisoning.

Pharmacologists, librarians, and other pharmacy college personnel who are frequently called upon to furnish poison information will find this book invaluable. No other *single* manual offers such varied data as are crammed into this compendium. Indeed, those seeking answers to most toxicity problems will rarely require any of the dozen different other source books which must commonly be consulted.

Another characteristic of this book is its practicality. Too many clinical toxicology texts are of little real value in emergency situations. Here, however, every page reflects the experience that can be acquired only by coping with actual cases. The authors have obviously known at first hand the countless perplexities that confront those attempting to perform this public health service.

The usefulness of this material is enhanced by the manner in which it is organized and presented. Each of the seven sections is prefaced by an introduction explaining how the information in it may be most effectively employed. A chart, which serves as a frontispiece, offers a graphic illustration of how the book may best be used and indicates how the various sections can be coordinated in handling hypothetical cases of different types.

The data contained in the several sections can be broadly categorized as: (1) Information concerning the contents of chemical specialty products and their potential toxicity; (2) Summaries of recommended procedures and techniques for treating poisoning by these products and chemicals.

The latter are especially well presented. Contrary to the practice common to most manuals, which set forth poison "treatment" measures too scant to be of use in actual practice, all aspects of treatment are discussed in detail and at length. While the authors also present short synopses for those who must read as they run, the book's finest feature for the scholar is its masterly exposition of the pharmacological, physiological, and biochemical bases for the recommended first aid, specific, and supportive treatment measures.

This is best exemplified in the uniquely thorough review of supportive treatment and in the sixty-eight monographs on the compounds most commonly involved in accidental poisoning.

Somewhat less satisfactory are the sections dealing with product information, including the "Trade Name Index." This section, so highly touted in the prepublication announcements, is not nearly so useful as it might have been. Deficiencies here are due to lack of cooperation from the manufacturers of household products. Despite the authors' protestations of good will toward their "collaborators," great gaps in their data give mute testimony of the failure of many manufacturers to cooperate.

This reviewer, who conducted a similar though less ambitious project, is all too familiar with the difficulties involved in getting manufacturers to divulge "secret" formulas. And, between the lines of the authors' explanation of why the product toxicity ratings originally included were deleted in proof, one can read the real reason—overt threats of legal action for libel.

The authors have attempted by various devices to minimize the weaknesses of the "Trade Name Index" in its present form. While a section on general formulations and one on manufacturers' names and addresses may help the harried physician get the answers he needs, there is only one real way in which he can quickly learn the contents of a product that has been ingested—by reading them on the label. If present legislative proposals requiring such labeling become law, the lengthy "Trade Name Index" might well be deleted from future editions.

The result would be a work, much less weighty, but one still worthy of a place in every pharmacy school reference library.

Morton J. Rodman
Rutgers University

Bioenergetics, A. Szent-Györgyi. Academic Press, Inc., New York 3, New York, 1957. x + 143 pp., 28 figs., 4 tbls. $4.50.

This book is a concise presentation of the author's views, interpretation, and speculative theories developed to account for the mode of transmission, use, and transformation of chemical energy into biological action. The 108 references will provide interested students with background, experiments, and additional available data which will provide fuel for additional speculation on alternate methods of transfer of energy. Biochemists, biologists, muscle physiologists, and pharmacologists will be pleased with the author's interesting and readable style in presenting theory and material, yet they may be unconvinced or even critical of the author's interpretation of available data on how energy is transferred from bond to bond and thence into biological action or abnormality of action. Many may agree with the author that "Energetics of the living world consists of only two processes; photosynthesis and its reversal." Others will question whether sufficient evidence is presented to establish "electronic excitation resulting in electrons going into a triplet state" as any more than a hypothesis applicable to the living organism.

The biochemist picking up the book in the library will be attracted immediately to chapters entitled, "The ATP Molecule,"

"Riboflavine," "On Oxidative Phosphorylation and Its Uncoupling," "Adsorption, Fluorescence and Phosphorescence." The medical student will probably turn immediately to those chapters entitled "On Myotonia," "On the Thymus," "On Oxidation, Fermentation, and Cancer." All will be baffled by the appearance of the profound thought, "God made the little fly, if you squash it, it will die."

The chapters entitled "Quenching and Quenchers," "On Drugs, Hormones and Disease," "Miscellaneous Observations," and "On Iodine and Chlorpromazine," should give the graduate student in pharmacology, who is struggling with the problem of presenting and interpreting new and insufficient data, some ideas which will soften the criticism of research directors reading his thesis.

This book will undoubtedly bring to the mind of most readers far more questions than it will answer. Certainly it should serve to provide considerable food for thought, stimulate new ideas, new experimental approaches to this problem, and perhaps serve to encourage the more adventurous souls to undertake the establishment of a quantum mechanical biochemistry, which the author recommends.

Myron N. Jorgensen
University of Kansas City

Principles of Microbiology, Charles F. Carter and Alice L. Smith. Third Edition. The C. V. Mosby Company, St. Louis, Missouri, 1957. 663 pp., 188 illus. $5.00.

The most striking feature of this text is the excellent organization in the presentation of the subject matter. The division of this material into "packages" (Units: e.g., "General Principles of Microbiology," "Destroying Microbes and Inhibiting their Growth," "The Relation of Bacteria to Infection, Disease and Immunity," etc.) makes the book ideal for systematic study by the student and the planning and presentation of the course by the teacher. In addition, "Laboratory Survey" and "Review Exercises" at the end of each unit are helpful to both student and instructor.

The treatment of sterilization and disinfection, important to the pharmacist, is thorough and excellent. Antibiotics and chemotherapeutic agents, their activity and their harmful side-effects, are accorded due emphasis. A complete highlight discussion of the many aspects of infection, immunity, resistance, and hypersensitivity give the pharmacy student important information which should be part of his specialized knowledge.

Presentation of course material on etiologic agents of disease, be they bacterial, viral, fungal, or of parasitological nature, is handled in such a fashion so as to emphasize aspects with which the pharmacist should be familiar. I feel that this treatment is adequate if the course in microbiology offered to the student in pharmacy devotes sufficient hours to laboratory study of representative groups of microorganisms of etiologic importance. If laboratory study is limited, I feel that the text for the student in pharmacy should offer more detail along this avenue.

In general, I feel that the book may be gainfully employed as a text in microbiology for the student in pharmacy, providing also an excellent framework for the instructor in building a suitable course of instruction.

Edward E. Vicher
University of Illinois

Brain Mechanisms and Drug Action, William S. Fields, Editor. Fourth Annual Scientific Meeting of the Huston Neurological Society. Charles C. Thomas, Springfield, Illinois, 1957. ix + 147 pp., 67 figs., 4 tbls. $4.25.

This symposium consists of six papers on the effects of drugs on various physiological systems of the brain and on behavioral patterns in the experimental animal. The subjects presented include Neurophysiology of the Reticular Formation, The Effect of Drugs on the Reticular Formation, The Effect of Drugs on Neurons and Synapses, The Influence of Drugs on Central Afferent Pathways, Centrally Acting Drugs and Pituitary-Adrenal Responses to Stress and A Comparative Approach to the Evaluation of Drug Effects upon Behavior. This symposium represents a cross-section of the current research in the area of neuropharmacology and includes the experimental evaluation of such centrally acting drugs as reserpine, chlorpromazine, pipradol (*Meratan*), lysergic acid diethylamide (LSD-25) diethazine (*Diparcol*), mescaline, serotonin, bufotenine and azacyclonol (*Frenquel*). Also reported are studies on the central nervous system effects of such classical pharmacological agents as the barbiturates, morphine, amphetamine, epinephrine, norepinephrine, acetylcholine, and others.

The paper by Dr. J. V. Brady on the effect of drugs on animal behavior delineates the possibility of evaluating agents using available behaviorial techniques and enumerates the limitations of such methods. The bibliography presented in the latter presentation is an extensive one and should be consulted by researchers contemplating future work in this new area of psychopharmacology.

The reviewer would recommend that this book be included in the pharmacy library, primarily for those graduate students who might be interested in neuropharmacological or psychopharmacological research. It is of little value to pharmacy students and practicing pharmacists.

Theodore M. Brody
University of Michigan

Methods of Biochemical Analysis, Volume IV, David Glick, Editor. Interscience Publishers, New York, New York, 1957. ix + 362 pp., 46 figs., 27 tbls. $8.50.

Methods of Biochemical Analysis, Volume IV, is the fourth volume of a series devoted to the techniques and instruments of analytical biochemistry. The entire series is designed to meet the very real need for extension of review services to this phase of biochemistry. The present volume has the same objectives, and follows the same general pattern as the preceding volumes.

The contents of Volume IV includes chapters on "The Determination of Carotene," "Determination of Vitamin A," "Determination of Poly-unsaturated Fatty Acids," "Determination of the 17, 21-dihydroxy-20-ketosteriods in Urine and Plasma," "The pH Stat and Its Use in Biochemistry," "Assay of Sulfatases," "Determination of Serum Acid Phosphatases," "Determination of Amino Acids by the Use of Bacterial Amino Acid Decarboxylases," and "Determination of Succinic Dehydrogenase Activity."

The same general plan is followed in the organization of individual chapters. This includes historical background, critical evaluations of the various procedures, and the presentation of complete experimental details. Coverage is surprisingly complete, and most assays can be carried out with the information given. The contributors are recognized as competent and thoroughly experienced in their individual fields. All reviews are in English, and there is a cumulative index.

The reviewer is very favorably impressed with the entire series, and has found it most useful. Research workers and graduate students in biochemistry or allied fields will find *Methods of Biochemical Analysis, Volume IV,* a valuable addition to the pharmacy college library. Undergraduate students will have little occasion to use it.

Gilbert C. Schmidt
University of Cincinnati

Lectures in Immunochemistry, Michael Heidelberger. First Edition. Academic Press, Inc., New York 3, New York, 1956. ix + 150 pp., 26 figs., 18 tbls. $3.50.

This small volume is, in the author's words, "an indolent man's response to the urgings of his friends that he write a book." The result is a happy one, for two reasons. First, it provides a concise account of many of the contributions of quantitative immunochemistry to our present concept of the immune response and antigen-antibody relationship. Second, the nine chapters are adapted from lectures, and the resulting style reflects the personality of the author to a degree not often found in scientific writing.

The presentation is not intended as a complete coverage of the field of immunity, but, rather, as selected topics which illuminate the methods and type of thinking by which significant advances in the field have been possible. The work cited is largely from the experience of the author and his students, who have contributed so greatly to the quantitation of antigen-antibody reactions. The bibliography and data cited are illustrative, rather than exhaustive, and provide the non-immunologist reader with glimpses of a fascinating field.

The book is recommended reading for graduate students and, indeed, for anyone with a background in science who, in an evening or two, wishes to be brought up to date in this field and, at the same time, review many of the steps and experiments upon which our present understanding is based.

Nelson F. Young
Medical College of Virginia

Ion Exchangers in Organic and Biochemistry, Calvin Calmon and T. R. E. Kressman, Editors. Interscience Publishers, Inc., New York, New York, 1957. xii + 761 pp., 102 figs., 52 tbls. $15.00.

The preface to this volume states, "The field of ion exchange has undergone a rapid growth in recent years and with this has come the recognition of its great utility as a tool in organic and biochemistry. This fact provides sufficient justification for a book on this aspect of the subject." This statement describes very well the purpose and form of the book. Thirty-seven specialists in the field of ion exchange have combined their efforts to bring together as much as possible of the recent data of value in the fields of biochemistry and organic chemistry.

The book is divided into three parts. The first part deals with the general nature and properties of ion exchangers. The second section has to do with techniques, apparatus, and materials. The third part, which constitutes fully three quarters of the book, consists of twenty-eight chapters each of which deals with a specific area of research.

To the pharmaceutical scientist who is using ion exchange processes or who wishes to know something about this valuable tool, the book is of great value. While the chapters dealing with such subjects as vitamins, antibiotics, alkaloids, medicinal, and pharmaceutical applications, etc. may be of most use, every one of the chapters will be of interest. For example, the chapters on the ion exchange characteristics of body tissue and cells are of interest to a student of any of the life sciences.

The volume is not particularly useful as a text, but serves as an excellent reference

for the latest data in the specific areas covered. There are some 2,600 references to original articles, most of which appeared in the years 1945-1955.

This reviewer hopes it is not quibbling to point out that the title contains the dangling adjective "Organic." It would be more correct to use "Organic Chemistry" or "Organic and Biological Chemistry." The nature of the title is such, however, that the meaning is obvious.

The volume should certainly be in the library of every pharmaceutical scientist and should be made available to undergraduate and graduate students in this field.

John M. Cross
Rutgers University

The Microbial World, by R. Y. Stanier, M. Doudoroff, and E. A. Adelberg, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1957. xxii + 682 pp., 219 figs., 31 tbls. $8.00.

This modern, introductory text for the beginner in bacteriology was written by three active teachers and researchers whose experiences in the modern aspects of physiology, biochemistry, genetics, and natural relationships—in the broad sense, ecology—of bacteria and higher biological forms, is impressively represented in the organization, detail, and scope of the book. It is, in the reviewer's opinion, the only really modern text suitable for instruction of students desiring a conceptual introduction to the bacteria.

The text proper is divided into Part 1, "The Properties of Microorganisms," and Part 2, "The Ecology of Microorganisms." Part 1 comprises nineteen chapters dealing with the general anatomical and physiological properties of microorganisms, and includes a fairly detailed discussion of four important groups of eubacteria: pseudomonads, coliform bacteria, lactic acid bacteria, and spore-formers. Brief general orientation is given respecting algae, protozoa, fungi, and the filterable viruses. Part 2 discusses, in eleven chapters, the relation of specific microorganisms to their usual habitats, in terms of cycles of elements, disease, and immunity, and, in one chapter, commercial exploitation. Part 3, entitled "The Biological Background," gives excellent basic material on general biological properties; genetics, evolution, and classification; and physiology. The profuse illustration is accomplished with modern photo-and electronmicrographs, and with elegant graphs and diagrams, many of which are original.

The text presupposes a good background of biological and, particularly, chemical knowledge. Recognition is given, however, to the frequently difficult transition from the predominantly morphological approach in biology and the primarily physical aspects of organic chemistry to the blending of these phases in microbiology. Part 3, used as a reference, should assist students in following the microbiological derivatives of these basic fields.

There is an excellent balance among the subjects covered, and, in general, good continuity. Rather less emphasis is placed on applied phases than in many comparable texts; reference is made in several places to applied aspects of a general topic. The authors' background is reflected in a somewhat uncommon (but not undesirable) emphasis on such exotic forms as the higher bacteria; it is equally evident in the conservatively modern expositions of anatomy, biochemical activities, and genetic properties of microorganisms. Throughout, the unity of biological principles is appropriately depicted, and the minor divergences of bacteria from these principles is delineated.

The insertion of three chapters of description of a few, particular, selected microbial groups between the chapters on growth and nutrition and those on mutation is unusual. The groups were selected judiciously, and the material can serve an indispensable function in teaching. The reviewer has found it helpful to use similar materials at an earlier stage in teaching, so that specific bacteria may be used to illustrate the principles of physiology, growth, and nutrition; this can be resolved in part by arranging reading assignments.

The phraseology of the text is clear, concise, and unequivocal without undue dogmatism. The type face is clear, and sufficiently large for easy reading; the paper and binding are of good quality. The diagrams are particularly well done, providing simple but accurate visual condensations of important concepts. There are no references nor bibliographies throughout the text; this contributes to a smooth flow in reading, but the absence of references at the end of each chapter is a serious deficiency, no less for its psychological effect in terms of training in scientific method than for its convenience for teacher and student in checking details of method and result.

This text can be recommended unreservedly for those courses in which the purpose is to provide a well-rounded grounding in microbiological concepts. It is unsuitable for those which enroll students lacking in basic biological and chemical background, or for those which have a highly applied objective.

M. E. Tyler
University of Florida

Kinetics and Thermodynamics in Biochemistry, H. G. Bray and K. White. First Edition. Academic Press, Inc.,

New York 3, New York, 1957. xii + 343 pp., 71 figs., 32 tbls. $7.50.

This excellent book was written by two British physiologists for honors and graduate students but should also appeal to scientists interested in the contributions of physical chemistry to biochemistry. To make the book comprehensible to as many types of readers as possible, each main topic is introduced at an elementary level before the main essential mathematical developments are treated.

This well-written book is divided into nine chapters. The topics discussed include: structure valence, wave theory of matter, molecular diagrams, and shape of molecules; particles in motion and principles of thermodynamics; equilibria in aqueous solutions, oxidation reactions, and phosphate compounds; rates of reactions, biological reactions, kinetics of open reactions, use of isotope tracers, and metabolic turnover rates; pathways of free energy and metabolism; and, in the last chapter, kinetics and the whole organism.

Physical chemists will find many familiar subjects applied to biochemical systems. This book provides one of the better treatments in this active and rapidly developing field. Each chapter contains numerous references to the original literature and appropriate monographs and reviews. The book has a satisfactory subject index. Pharmacy, dental, and medical school teachers and graduate students in the basic science disciplines as well as all those in the biological fields should find this book very helpful.

Emil G. Schmidt
University of Maryland

College Physics, Robert T. Beyer and A. O. Williams, Jr. First Edition. Prentice-Hall, Inc., New York, New York, 1957. xi + 660 pp., 358 figs., 17 tbls., 8 plates. $7.50.

Most physics textbooks are very uniform, but this book is unusual in style. It should stimulate the experienced teacher and refresh his lectures which sometimes become quite stereotyped. A beginner would profit immensely by a careful reading of the book accompanied by a consultation of the references to be found at the end of each chapter. Such a reading would be profitable whether or not this book were to be used as the text in the course. These references are an important aspect of this book. Twenty-five books and magazines are listed.

The first chapter covers fourteen pages and is devoted to a careful resumé of the most important men and their contributions to physics from Thales and Pythagoras to the present. Chapter Two shows the relation of physics to the other sciences. These chapters are written in a style to stir the enthusiasm of the student.

The treatment of the subject proper begins with mechanics as usual and gives it the lion's share of space. This amounts to eight chapters and covers 176 pages. The treatment of mass and weight is particularly good. This distinction is made very clear, and the confusion of units likely to occur is frankly discussed—a point so often avoided. Another excellent feature of this book is the frank caution given regarding the use of words. The use of familiar words in a restricted way often causes confusion.

Heat and sound suffer considerably from lack of space in their treatment. Three chapters covering sixty-three pages are devoted to heat, but sound is limited to one chapter of twenty pages. The physical basis of music is ignored almost completely. This seems regrettable in a book presented for use in a liberal arts course. Light precedes electricity which is unorthodox but acceptable. The space devoted to the treatment of light is in keeping with the size of the book. Four chapters and eighty-six pages may seem a bit small, but spectroscopy is largely left to the part on modern physics.

Magnetism has not been separated from electricity, but the pertinent information has been included. Here again the space: four chapters, covering eighty-five pages, seems sufficient since the treatment of electronics has been relegated to modern physics.

The section on modern physics is particularly well done. Seven chapters covering 140 pages are devoted to it. These chapters are well written and will give the student a feeling he is being rewarded for the weeks of hard work he has spent on the less glamorous portions of the subject. Naturally this portion of the book is mainly qualitative in form, and where a quantitative discussion is given the formulas are offered without derivation. The authors state in the preface that no mathematics beyond algebra and trigonometry is required. This is true, but the devious methods used avoiding calculus are sometimes amusing. The appendix lists the most-used formulas from algebra and trigonometry and offers an excellent resumé of the constants relating physical measurements. There are answers to about one half of the problems, but no order of selection is discernible. This book rates excellent as a choice for the text in a course in physics intended to be both popular and authentic.

O. K. DeFoe
The St. Louis College of Pharmacy and Allied Sciences

International Encyclopedia of Cosmetic Material Trade Names, Maison G. de-Navarre. First Edition. Moore Pub-

lishing Company, Inc., New York 18, New York, 1957. lvi + 369 pp. $7.50.

The need for an encyclopedic publication of cosmetic material trade names has been evident to the author for more than twenty-five years. As the number of products continued to grow this need became apparent not only to the author but to the personnel of the purchasing departments and laboratories of industry as well as to suppliers who wished to avoid duplications in the choice of names for their products.

Pages one through 290 are devoted to trade names alphabetically arranged and followed by brief descriptive entries and the name and address of the supplier. The author has made no attempt to make this a chemical reference book, and few chemical names are used. The "data in this book were compiled from manufacturers' publications, brochures, advertising, correspondence, and the trade and scientific literature of the industry."

Pages 291 through 341 contain a listing of the products according to use. This section is cross-indexed with the trade-named materials. The author carefully points out that there may be some disagreement with his selection for usage but explains that he has attempted to choose the "most common or obvious applications."

The names and addresses of all manufacturers mentioned in the book are listed under a section from page 345 through page 369 called, simply, "Manufacturers' Directory Section."

The compilation of a work of this type is a time-consuming and often frustrating undertaking. While it is comprehensive it is not complete and for this reason the author has inserted a box in several places in his book in which he makes the following statement, "In a listing accumulated over a span of twenty-five years, it is entirely possible to have omitted some trade names and to err in the description of others. Therefore, the author solicits readers to call to his attention all omissions and inaccuracies. These will be corrected in the forthcoming second edition of this encyclopedia.

"The author solicits data on all new materials as they are introduced into commerce so that it can be included in the expanded second edition."

A publication of this type, with an international listing of over 3,000 cosmetic material trade names, requires a great deal of foresight and planning. It seems inappropriate for the reviewer to look for or point out errors and omissions but, rather, as suggested by the author, leave this to the manufacturers who are familiar with the composition and uses of their own products. Substantial backing from the cosmetic industry is indicated by the forty-six companies represented in the "Advertisers' Section" included in the introductory pages of the book.

This encyclopedia is a valuable reference book for everyone interested in cosmetics or cosmetic formulations. It should be included in the libraries of the colleges of pharmacy and the research libraries of industrial firms. The comprehensive listing, concise descriptions and statements of use can be of great service to many, and hours of searching for scattered information can be eliminated by its use.

Jean Brown
University of Oklahoma

Instrumental Analysis, Paul Delahay. The Macmillan Company, New York, New York, 1957. xi + 384 pp., 137 figs., 24 tbls. $7.90.

The literature of analytical chemistry is rich in describing the many applications of instrumentation to analytical procedure. It is difficult to predict to what extent courses in analytical chemistry on the undergraduate level will ultimately be modified to include instrumental techniques. The knowledge of the application of instrumentation to analytical procedures is of major importance to any graduate student in pharmacy, for there is no area which does not make use of at least one such instrument, even if it be only a pH meter. It is important for the student to recognize the function of the instrument as well as to learn its immediate application.

This excellent publication fills a long-felt need for a text in instrumental analysis which does more than provide "pushbutton" techniques. The author has presented the material by providing the fundamental theory for each method followed by discussion of the method itself including schematic diagrams of the instrument employed. No attempt has been made to describe commercial instruments, but the author has provided names of manufacturers instead. At the end of each chapter there is an excellent, up-to-date bibliography followed by problems which are well devised to stimulate further inquiry by the student, who is presumed to have had a course in elementary physical chemistry.

Important methods not usually covered in a course in physics or in physical chemistry are discussed. These discussions are simply and clearly presented with little, if any, ambiguity. If any fault should be found with the organization of the book, it would be with the omission of a unit devoted to electrophoresis. Whether a chapter on chromatographic methods should have been included is a moot point, considering the scope of this work.

Chapters dealing with potentiometry,

polarography, emission spectroscopy, and absorption spectroscopy are considered to be most essential for an abridged course in this area. For a more extensive and detailed program, chapters on electrode potentials, amperometric and voltammetric titrations, electrogravimetry (including coulometric methods), conductometry and high-frequency methods, fluorometry (including sections on nephelometry and turbidimetry), Raman spectroscopy, X-ray methods, mass spectometry, and nuclear radiation methods are provided. In the section on laboratory experiments twenty-three experiments are described. These are well organized and clearly written, with suggestions for further work included.

This text is highly recommended for a course in instrumental analysis for adequately prepared undergraduate as well as graduate students.

Samuel S. Liberman
Columbia University

Neuropharmacology, Harold A. Abramson, Editor. Transactions of the Third Conference on Neuropharmacology. Josiah Macy, Jr. Foundation, New York, New York, 1957. 381 pp., 133 figs., 20 tbls. $4.50.

This volume is another compilation of conversations and discussions typical of Macy Conference publications. The Transactions of the Third Conference, like those of other Macy Conferences, are arranged in sections, each section covering one conference meeting. Topics discussed, and directors, are as follows: Blocking of the LSD-25 Reaction in Fighting Fish, H. A. Abramson; Effects of LSD-25 on Snails, M. E. Jarvick; Production and Control of Alcoholic Craving in Rats, C. P. Richter; Stress Situations in Animals and the Nature of Conflict, J. H. Masserman; Action of Alcohol on the Central Nervous System, J. H. Quastel; Measurement of Subjective Responses, H. K. Beecher; Effects of Psychosomimetic Drugs in Animals and Man, J. Elkes; Origin of Cortical Surface Potentials, D. P. Purpura; Serotonin and Norepinephrin as Antagonistic Chemical Mediators Regulating the Central Autonomic Nervous System, B. B. Brodie; Brain Responses to Drugs Mapped Through Self-Stimulation, J. Olds. Participants in this conference, of whom there were a total of thirty, were, as usual, selected so as to present a multidiscipline approach to the problems of neuropharmacology.

Formal presentation of a research paper has not in any single instance been a feature of these conference programs. Each section merely contains the informal discussions which occurred among the participants of that particular conference program. The conductor of each section has sought to highlight in an informal manner some of the more interesting aspects of his or her research with the expectation, always realized, that there would be frequent interruptions by participants in the form of questions, criticisms, and constructive comments. Interruptions and comments during the presentation of each topic have been most numerous, and in most instances can be said to have formed an essential part of the "group interchange."

This volume no doubt furnishes an insight into the most modern methods employed by research workers in neuropharmacology and related fields. Challenging theories of drug action at the nervous level are put forth in each section, with summaries of experimental findings which tend to support or disprove theory. It no doubt stands at the frontier of research methods and theories of neuropharmacological activity in so far as these are related to the drugs and research methods of the various sections covered.

Designs, discussions, and explanations of research procedures seem sufficiently comprehensible to permit their duplication by the average newcomer in the field of neuropharmacology. The subject matter and vocabulary are usually explained fairly well in the context of the printed discussions. However, this is not a volume which the average specialist in general pharmacology could grasp by a hurried reading, as many of the thought patterns are quite subtle, and very careful reading and re-reading would be necessary to digest the contents of each section.

More than elementary knowledge of the field of neuropharmacology is very difficult to obtain by casual or random reading in pharmacology. This volume should fill a pressing need in the reading background of one who may be especially interested in neuropharmacology, either from the standpoint of the teacher or research worker. It would be of little value to the undergraduate pharmacy student.

Elbert Voss
University of Florida

Alcoholism, Harold E. Himwich, Editor. First Edition. American Association for the Advancement of Science, Washington, D.C., 1957. xiii + 212 pp., 33 figs., 11 tbls. $5.75 (to AAAS members $5.00).

This comparative short volume consists of eighteen scientific papers presented at a symposium held in Atlanta, Georgia, December 27-28, 1955. In addition there is a somewhat humorous and very interesting introduction to the subject by Dr. Chauncey Leake and a summary of the symposium by the Editor.

The book is divided into two parts, a) "Basic Aspects" and b) "Treatments." The first section contains eighty-three pages mainly concerned with the physiological effects of alcohol on the living systems, including the action of alcohol as a stressing agent as well as a depressant, the metabolism of alcohol, its effects on the sexual reflexes of dogs, disturbances in carbohydrate metabolism in patients with alcoholic brain diseases, and some effects of thiamine in this condition.

The next 106 pages of the book contain papers on the treatment of acute and chronic alcoholism including psychotherapy, drug therapy, and the improvement of the social environment. Many of the contributors to this section discuss the great importance of Alcoholics Anonymous in the modern treatment of alcoholism. Some of the drugs included as possible therapeutic agents are chloral hydrate, paraldehyde, barbiturates, meprobamate, azacyclonol, chlorpromazine, promazine, reserpine, *Disulfiram,* insulin, glucose, and fructose. As there are ten papers on the treatment of alcoholism there naturally is some repetition; however, since each group of investigators approaches the therapeutic measures from a different point of view, this reviewer finds the repetition definitely desirable.

Although this book does not contain all the information one might desire on alcoholism, it definitely is a valuable contribution to a very interesting and vital area and is recommended as a reference for students and investigators in pharmacology, biochemistry and therapeutics.

Joseph P. Buckley
University of Pittsburgh

Guide to Medical Writing, Henry A. Davidson. The Ronald Press Co., New York, New York, 1957. vii + 338 pp., 12 figs. $5.00.

The art of writing interesting as well as informative articles is often woefully lacking. The public health field is no exception to the areas in which this lack is evident. While it is doubtful that the reading of any book will necessarily make good writers, Dr. Davidson has prepared a book which should be helpful.

Dr. Davidson had presented what could be a dull subject in a most interesting and readable manner. Throughout the book the presentation is full of sparkle. Points are illustrated liberally and effectively. Good humor is frequently evident.

The first 230 pages deal with writing an article. The subject is thoroughly covered from "stalking the idea" to setting up the bibliography and preparing illustrations. Although the presentation is usually even tenored, at times the author suggests excessive dramatization for a technical article. However, this may be justifiable because of the tendency of many medical writers to write in such a dull manner. Conversely, in the chapter on readability, it is suggested that words be cut to a minimum. The illustrations emphasize this point to such an extent that sentences dangle without adequate words to tie the thoughts together. Again, this overemphasis may be justifiable on the basis that many medical writers are likely to be wordy in their presentation.

Although this book is written primarily to physicians, pharmacists are frequently introduced in the discussions. The principles presented are applicable to writing in pharmacy as well as to that in any of the other health areas. Pharmacists will be interested in the brief, good section on the writing of prescriptions. In only a few instances could pharmacists take exception to points made, such as the one on page 122, "No pharmacist is going to measure out 0.32 Grams."

The concluding chapters of the book present factors to be considered in writing an editorial, in writing a book, in reading and correcting proof, and tell how to prepare abstracts, book reviews, and reports of meetings.

It is unlikely that any writer in the medical or related health fields could read this book without receiving some new or renewed ideas for the improvement of his writing. For most writers, the careful application of the material contained in this book will bring new interest and clarity to their writing.

Kenneth E. Avis
Philadelphia College of Pharmacy and Science

Phosphorus and Fluorine: The Chemistry and Toxic Action of Their Organic Compounds, B. C. Sanders. Cambridge University Press, New York, New York, 1957. xiii + 231 pp., 23 figs., 2 plates. $6.00.

This book is a monograph concerning the chemical behavior and pharmacological activity of two classes of compounds: the fluoroacetates and the phosphofluoridates. The author gives a complete review and the status of specific compounds which are of pharmacological significance and interest.

The book is divided into ten chapters. The first chapter is an introduction and general survey of the fluoroacetates and the phosphofluoridates. The other chapters elucidate the accepted phosphorus nomenclature, review briefly the anatomy and physiology of the human nervous system, and review the synthesis of the various types of compounds. Two special chapters are included: one concerns the

use of the compounds as insecticides, and the other chapter gives a detailed description of their esterase-inhibitory activity and its application to experimental and clinical medicine.

Throughout the monograph the author correlates chemical structure and physiological activity. As most of the research and interest in these compounds are based on military and defense considerations (both are chemical warfare agents), this correlation is most important and timely not only in the development of similar agents but also in the establishment of protective measures and antidotes.

The metabolic pathways of fluoroacetates and phosphofluoridates explain why certain members of each class are effective pharmacological agents while others are not. Several compounds were synthesized to determine whether oxidation in tissues is necessary for the assimilation and subsequent physiological activity of these compounds. This type of approach provides some correlation between the oxidation time and physiological effect.

There are two noteworthy features in this monograph concerning the fluoroacetates and phosphofluoridates which could very well be incorporated in all advanced-type monographs. One is a general bibliography of the information presented in each chapter. The other is an appendix citing the special methods and techniques necessary for analysis of these compounds. The inclusion of analytical methodology will be especially helpful to those engaged in this area of research.

I recommend this monograph as a reference for neuropharmacological research.

Joseph A. Feldman
Duquesne University

The Association should encourage experimentation in pharmaceutical education when careful plans are made and the students' professional education is assured.

J. Allen Reese, Am. J. Pharm. Ed., 16, 148 (1952)

NEW BOOKS

A Manual of Pharmacology, Torald Sollman. Eighth Edition. W. B. Saunders Co., Philadelphia, Pennsylvania, 1957. xi + 1535 pp. $20.00.

Zinsser Bacteriology, David T. Smith and Norman F. Conant. Eleventh Edition. Appleton-Century-Crofts, Inc., New York, New York, 1957. xiii + 953 pp., 421 figs., 107 tbls. $12.00.

Biochemical Contributions to Endocrinology, Sir Charles Dodds. Stanford University Press, Stanford, California, 1957. 76 pp., 28 figs. $3.00.

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Chemistry of Plants, Erston V. Miller. Reinhold Publishing Corp., New York 22, New York, 1957. vii + 174 pp. $4.75.

Colorimetric Analysis, Volume I, Noel L. Allport and J. W. Keyser. Second Edition. The Macmillan Company, New York 11, New York, 1957. xi + 424 pp., 21 tbls., 11 figs. $9.00.

Cultural Foundation of Education, Theodore Brameld. First Edition. Harper & Brothers, New York, New York, 1957. ix + 330 pp. $5.00.

Dictionary of Poisons, Ibert and Eleanor Mellan. Philosophical Library, Inc., New York 16, New York, 1956. 150 pp. $4.75.

Industrial Toxicology, Lawrence T. Fairhall. Second Edition. The Williams & Wilkins Company, Baltimore 2, Maryland, 1957. xii + 376 pp. $10.00.

Medical Writing, Morris Fishbein. Third Edition. McGraw-Hill Book Company, Inc., New York 36, New York, 1957. x + 262 pp., 36 figs. $7.00.

Micro-Analysis in Medical Biochemistry, E. J. King. Grune & Stratton, Inc., New York 16, New York, 1956. xi + 292 pp., 25 figs., 18 tbls. $4.00.

Psychopharmacology, Nathan S. Kline. The American Association for the Advancement of Science, Washington 5, D.C., 1956. x + 165 pp., 11 tbls., 3 figs. $3.50.

Review of Physiological Chemistry, Harold A. Harper. Sixth Edition. Lange Medical Publications, Los Altos, California, 1957. 376 pp., figs., tbls. $4.50.

Solvent Extraction in Analytical Chemistry, George H. Morrison and Henry Freiser. John Wiley & Sons, Inc., New York 16, New York, 1957. xi + 269 pp., figs., tbls. $6.75.

Systemic Organic Chemistry, Hugh C. Muldoon and Martin I. Blake. McGraw-Hill Book Company, Inc., New York 36, New York, 1957. viii + 828 pp. $7.75.

The Carbohydrates, Ward Pigman. Academic Press, Inc., New York 3, New York, 1957. xvii + 902 pp., tbls., figs. $20.00.

Pharmaceutical Calculations, Willis T. Bradley, Carroll B. Gustafson and Mitchell J. Stoklosa. Third Edition. Lea & Febiger, Philadelphia 6, Pennsylvania, 1957. 325 pp., tbls., illus. $4.50.

Quantitative Pharmaceutical Chemistry, Glenn L. Jenkins, John E. Christian, and George P. Hager. Fifth Edition. McGraw-Hill Book Company, Inc. New York 36, New York, 1957. x + 552 pp., 80 tbls., ref. tbls., 61 figs. $8.50.

Education in the U.S.A., W. Kenneth Richmond. Philosophical Library Inc., New York, New York, 1956. 227 pp. $4.50.

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The Teacher's Role in American Society, Lindley J. Stiles. Harper & Brothers, New York 16, New York, 1957. xxi + 298 pp., 11 tbls. $4.00.

Colleges for Our Land and Time, Edward Danforth Eddy, Jr. Harper & Brothers, New York 16, New York, 1957. xiv + 328 pp. $4.50.

The American University in the Twentieth Century, William Clyde DeVane. Louisiana State University Press, Baton Rouge, Louisiana, 1957. xi + 72 pp. $2.50.

The Functions and Education of Medical Record Personnel, The Study Group of the Graduate School of Public Health, University of Pittsburgh. University of Pittsburgh Press, Pittsburgh 13, Pennsylvania, 1957. viii + 78 pp., 3 tbls. $2.00.

International Yearbook of Education, Vol. XVII, UNESCO, Columbia University Press, New York 27, New York, 1955. 452 pp., tbls. $3.50 (paper).

Biochemical Disorders in Human Disease, R. H. S. Thompson and E. J. King. Academic Press, Inc., New York 3, New York, 1957. xiv + 843 pp., figs., tbls. $12.60.

Introduction to Statistical Analysis, Wilfrid J. Dixon and Frank J. Massey, Jr. Second Edition, McGraw-Hill Book Company, Inc., New York, New York, 1957. xiii + 488 pp., figs., tbls. $6.00.

The Chemistry and Biology of Purines, G. E. W. Wolstenholme and Cecilia M. O'Connor. Little, Brown and Company, Boston, Massachusetts, 1957. xii + 327 pp., 124 illus., figs., tbls. $9.00.

Progress in the Chemistry of Organic Natural Products, Volume 13, L. Zechmeister, Editor, Springer, Vienna, 1956. 624 pp., illus. $26.50.

Why Teach?, D. Louise Sharp. Henry Holt and Company, New York, New York, 1957. xiv + 240 pp. $4.00.

Antiseptics, Disinfectants, Fungicides & Chemical and Physical Sterilization, George F. Reddish. Second Edition. Lea & Febiger, Philadelphia 6, Pennsylvania, 1957. 975 pp., 134 tbls., 67 figs. $15.00.

Organic Reactions, Volume IX, Roger Adams, Editor. John Wiley & Sons, Inc., New York 16, New York, 1957. 468 pp. $12.00.

NEW FILMS

For More Tomorrows. 16 mm. sound color film, 28 minutes. A Lederle salesman tells the history of antibiotic research. Available on loan free from Film Library, Lederle Laboratories Division, American Cyanamid Company, Pearl River, New York.

There is a tendency today on the part of colleges to give undue emphasis to the materialistic and the practical aspects of the profession.

Bernard V. Christensen, Am. J. Pharm. Ed., 14, 233 (1950)

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